THE IRON AGE

THURSDAY, DECEMBER 8, 1892.

The Excelsior Iron Works, Chicago.

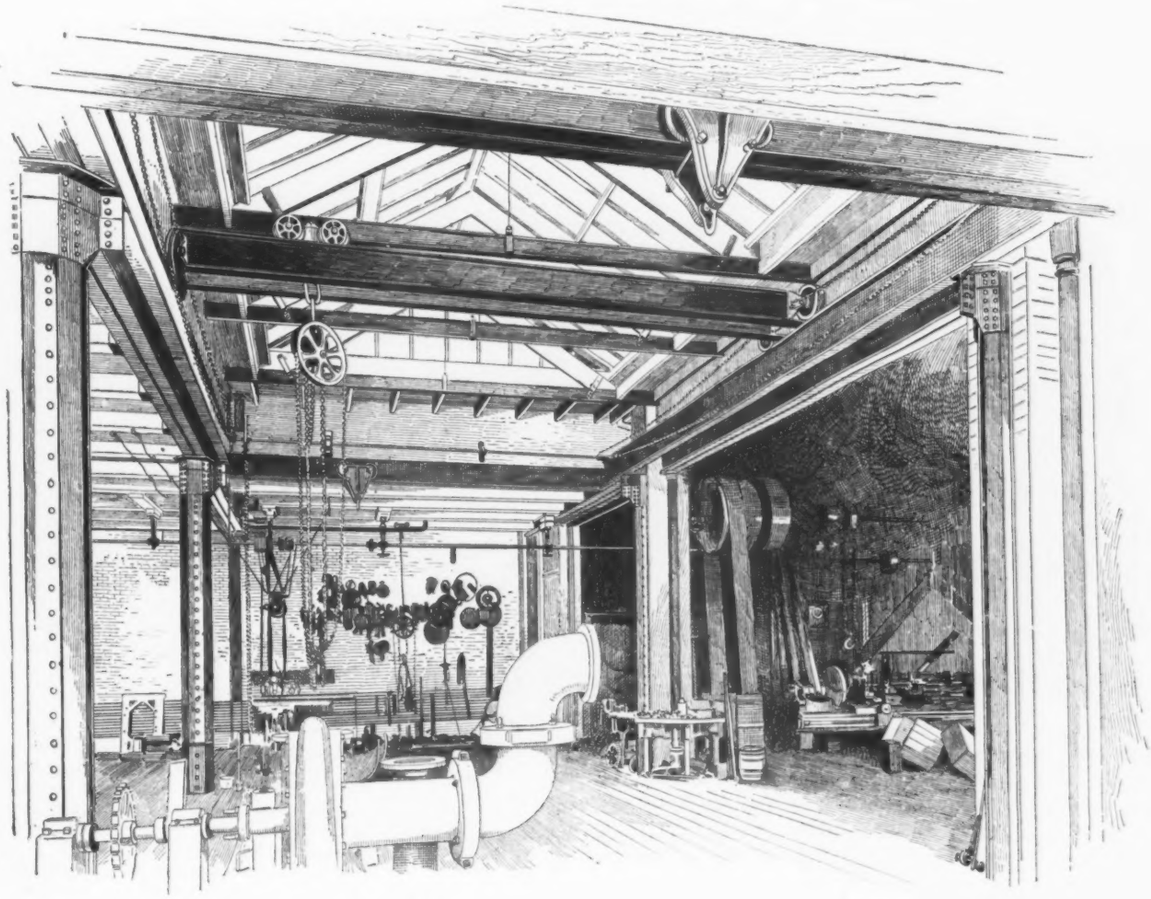
An illustration is herewith given of a portion of the interior of the machine shop of the Excelsior Iron Works, 96 to 100 North Clinton street, Chicago. The object of the illustration is to show the method adopted in this establishment for handling heavy work without resorting to expensive appliances. A brief description of the building and the method pursued in its construction will be a necessary preliminary.

The building is a comparatively new one, having been occupied within the past twelvemonth. It is of brick, five stories high in front and four stories in the rear, covering a space of 150 by 75 feet. The Larimer steel columns and steel I-beams manufactured by Jones & Laughlins form the basis of the interior frame work, the joists being of wood for convenience in hanging shafting. The first floor, or basement, is used for storage and other purposes, and the three top stories are used for light machinery, pattern making, &c. The machine shop proper is on the second floor. Everything here is of the most substantial character, the floor being calculated to safely support a load of 500 pounds to the square foot, while the columns are very heavy and the main girders overhead are each composed of two 15-inch I-beams to endure the double strain of the load on the floor above and travelers to serve the floor below.

The view which is here given is taken in the center of the machine shop, which is fitted with a skylight, the building having been constructed with a central court for this purpose. A hand traveling crane is rigged immediately under the skylight. Here all erecting work is done, under a flood of light from above as well as from windows on one side. When the traveling crane is in use at one end of this space, and some lifting has to be done at the other end of it, a trolley is brought into play which travels on the lower flanges of the beams in the ceiling. The hook of a block and tackle is attached to the ring of the trolley, and the load can then be lifted and moved, but, of course, in a straight line only. Similar trolleys are fitted to the ceiling beams in other parts of the shop, and have proved to be a great convenience, as the spaces between girders are quite wide, giving each trolley a good runway. Another point gained in the use of the trolleys is the avoidance of injury to the floor timbers by boring holes in them, which is often done to support hoisting tackle.

The Larimer column, as used in the construction of this building, is highly commended by the owners for the manner in which it has endured the heavy load it is constantly required to carry. They were among the first to use the new column.

The Excelsior Iron Works manufacture dredge and bridge machinery, pile drivers, mining machinery, boilers, steam engines, &c. An interesting piece of work recently turned out by them was an outfit of dredging machinery for use in Idaho placer gold mining. The Red River Mining Company desired to dredge the bottom of a creek containing a considerable body of water, the bed of the creek being known to carrry a rich deposit of gold. They ordered an engine, boiler, centrifugal pumps, sluice boxes, &c., specifying that no part as packed for shipment should weigh over 300 pounds, the scene of their mining operation being 130 miles from the nearest railroad, and only reached by mountain trails traversed by mules and Indians as freight carriers. The hull of the dredge was built on the ground, the machinery was put in place, and at last accounts the dredge was actively at work taking out the auriferous gravel.



HANDLING HEAVY WORK AT THE EXCELSIOR IRON WORKS, CHICAGO.

Austin Corbin, president of the Long Island Railroad Company, adheres to his plan for building a tunnel under the East River at the Battery to connect the elevated railroad system of New York with the Long Island Railroad. It is understood that Mr. Corbin insists that this tunnel could be constructed within three years. The plans contemplate a tunnel 26 feet in diameter and over 6000 yards in length, to cost, with approaches and equipped for use and lighted by electricity, about $2,500,000. Apparently there is no obstacle to prevent the carrying forward of the work.

The American Society of Mechanical Engineers.

In our issue of last week we presented the address of the president of the society, Charles H. Loring. We now follow with the report of the meeting from Wednesday morning, November 30, to Friday morning, December 2. During the sessions much interest was manifested in the papers presented, some of which called forth more than the usual amount of discussion.

The first business to properly come before the society was the reports of the Standing Committees. The committee appointed to confer with similar committees appointed by the civil, mining and electrical societies reported that a congress of engineers of the world would be held in Chicago July 30 to August 5, 1893, the first and last sessions to be held at the Art Memorial Building, the others to be held in a suitable building that had been secured. There will be no joint entertainment, but each society will conduct its own proceedings, the papers to be presented before it being accepted by its own management in the usual way. The proceedings will be published entire, the plan being to sell the volumes at cost. A headquarters for the use of engineers visiting the fair has been obtained.

The committee appointed to consider standard gauges for metal sheets and plates presented in tabulated form a somewhat complicated array giving the gauge numbers in fractions of an inch. A few examples will show the unwieldy proportions of this method. Gauge number 15 is $\frac{8}{128}$ inch, number 17 is $\frac{9}{160}$ inch, number 19 is $\frac{7}{160}$, number 21 is $\frac{11}{320}$, number 23 is $\frac{9}{320}$, and so on. It was pointed out in discussion that one of the simplest methods was to consider all measurements in parts of a thousandth; thus 5 would mean 0.005, 50 would mean 0.050. These numbers could be easily remembered and easily measured with the micrometers now in such common use. Moreover, the values could be readily changed into the metric system by simply knowing the relation the inch bears to the centimeter.

The report of the tellers of election showed that the following officers had been elected for the ensuing year: Eckley B. Coxe, president; C. W. Hunt, T. R Pickering and Edwin Reynolds, vice-presidents; Wm. H. Wiley, treasurer; Charles H. Manning, John Thomson and C. W. Pusey, managers.

During the year there were 180 applications for membership. The society now numbers 1569 members, divided as follows: 17 honorary, 39 life, 1273 full members, 68 associates and 211 juniors.

The society is in a flourishing financial condition, there being a balance in the treasury of $1628. The receipts last year were $34,195, an increase of 73 per cent. over the year preceding.

The first paper presented was by Fred. H. Daniels of Worcester, Mass., on

An Interesting Boiler Explosion,

from which we take the following:

A report upon a peculiar rupture which took place in one boiler of the steam plant of the Washburn & Moen Mfg. Company, Worcester, Mass., may be of interest to many of our society.

Six years ago they equipped a portion of their plant with a battery of six horizontal tubular boilers, from plans furnished by H. S. Robinson & Co. The boilers were 5 feet in diameter, with tubes 19 feet 8 inches long, and were designed to carry a working pressure of 125 pounds to the square inch. The advantages of subjecting materials for boilers to a careful test by the consumer before accepting them were brought to our attention by H. S. Robinson, senior member of the firm mentioned, and we decided to have all the materials for our boilers, especially the shell plates, tested in a very exhaustive way at the Watertown Arsenal, before permitting any of the material to be used. One plate out of the entire lot was condemned. These boilers have been in successful operation for nearly six years and are still in use. They are inspected every week. The water is run out, the man holes removed and the interior as well as the exterior of the boilers carefully examined. As the water in the streams in the vicinity of Worcester is very pure, coming as it does from the granite hills, we never find scale in the boilers, but in the spring and fall, during high water, it is not uncommon to find a small deposit of *débris*, which is carefully washed out.

With all this care, the accident was to us a real surprise. When it happened, the plant was running as usual, but the boilers were somewhat forced, although not to any extreme limit. Without any warning whatever, and with very little noise, the firing doors of the furnace were burst open, coal, ashes and water thrown out, and the boiler house in an instant filled with steam.

As soon as an examination could be made it was found that one of the plates in the third row, just over the most intense heat, had bagged and ruptured, leaving an orifice about 1 inch in diameter, thinning the metal around the orifice to a knife edge. The remainder of the shell was not damaged, because the boiler quickly emptied itself of water and steam, which extinguished the fire and cooled the brick work. The accompanying drawings (Figs. 1 and 2) illustrate the exact location of the rupture, also the arrangement and details of the boiler and setting. A careful inspection failed to discover scale or *débris* of any kind inside the boiler. The other five boilers of the battery were also examined at the same time, and we found two of them with their lower sheets slightly wavy, but nothing approaching a bag. The ruptured portion was cut out and a patch supplied in its place. The boiler has been in constant use since, without any further sign of failure.

Upon examination of the cut-out piece (exhibited at the reading) we found a very thin black scale around the rupture, and nearest the orifice it looked as if the plate had been highly heated, so highly, in fact, as to permit the cutting away of the hot metal. We carefully calculated the cubical contents of the plate (see Fig. 3), and found that there were 1.41 cubic inches less material in the half 10-inch circle, after rupture, than there was in the plate before. These figures, together with a careful examination of the plate, seem to indicate that for a few moments

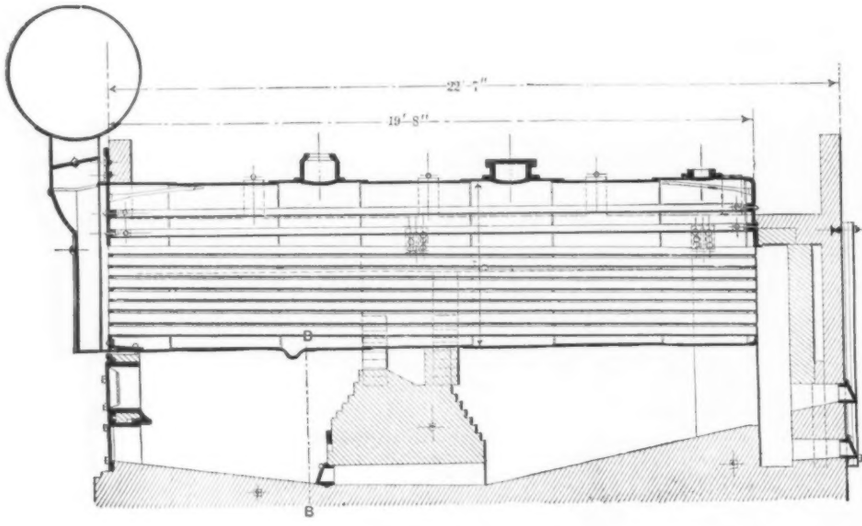


Fig. 1.—Section on Line A A.

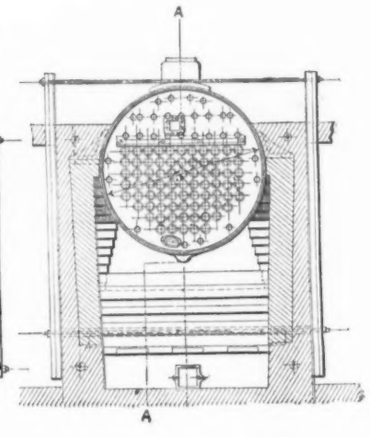


Fig. 2.—Section on Line B B.

AN INTERESTING BOILER EXPLOSION.

before the rupture the plate was subjected to a very high, possibly to a white, heat, and when the metal became sufficiently plastic and was in a proper condition for such a result, it simply flowed out, as shown in exhibited plate. It seems reasonable to suppose that this plate had been overheated for a very few minutes only, and that previous to the time of rupture it had been in perfect condition, for the boilers were carefully inspected only four days previous to the accident and everything was found in good order. Two or three times during the past 20 years we have had boilers bag, but never before had one rupture.

All of the shell plates in this battery of boilers were stamped with numbers, and the original report on the tensile strength tests preserved. By referring to these records we found that the plate which was ruptured had on one end a tensile strength of 68,050 pounds and on the other end 65,650 pounds per square inch. It also stood well the "burr test" for annealing and water chilling. By way of comparison, two test pieces were planed from the ruptured plate. The test piece which was farthest from the bulge held 60,486 pounds to the square inch and had a reduction of area of 41 per cent. The test piece close beside the rupture held 61,666 pounds to the square inch, and had a reduction of area of over 32 per cent. It will be observed that the tensile strength is considerably less in the ruptured plate than in the original tests of the plate. This may be accounted for, however, by reason of the test piece having a twist in it, occasioned by the bulge in the plate, and having been put into the testing machine without straightening. "Burr tests" were also made. One of them, heated high and allowed to cool in the air, was hammered together as shown; the other, heated to redness and plunged in cold water and hammered as shown without failure (exhibited "burr test" made from the bulged plate). The analysis of the ruptured plate is as follows:

	Per cent.
Phosphorus	0.063
Sulphur	0.022
Silicon	0.024
Manganese	0.261
Carbon	.10

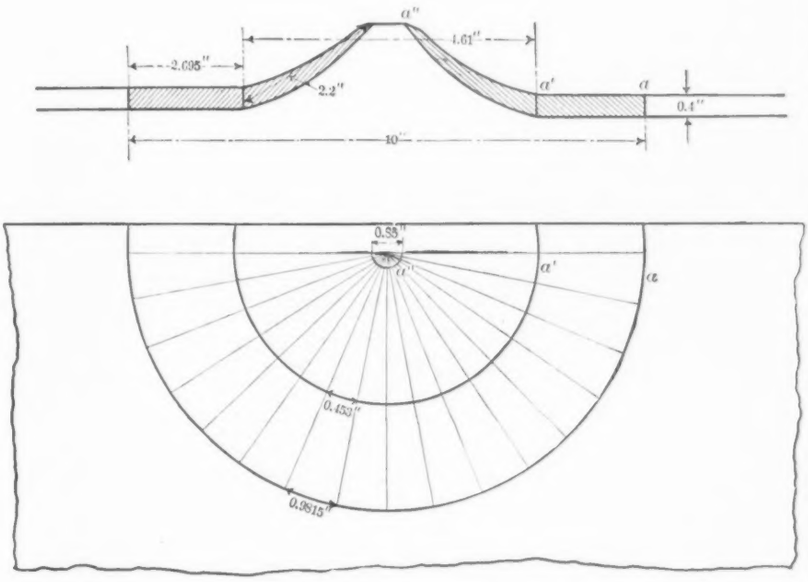


Fig. 3.—Section at Point of Rupture.

AN INTERESTING BOILER EXPLOSION.

The conclusions the writer arrives at are that the importance of mechanical, physical and chemical tests cannot be overrated. While the plate makers invariably subject their plates to tests and stamp them accordingly, at the same time, a confirmation of quality by the consumer is desirable, for we have seen that, in the tests at Watertown, one plate was condemned. If the ruptured plate had been of improper material or had contained sufficient carbon to harden when the water came in contact with the overheated plate, a crack might have developed, resulting in a serious explosion, possibly destroying the entire plant and causing a loss of life.

DISCUSSION.

Allan Stirling said: In this valuable paper Mr. Daniels has contributed to the society a complete record of an interesting accident, which, on account of the excellent method adopted can scarcely be called an explosion. Horizontal tubular boilers frequently give trouble at this point. Many of the members of this society have no doubt had this experience. Bags are often found on horizontal boilers at this point. The case reported can be explained in this way. The water came from granite hills, and both the interior and exterior of the boilers were examined every week and neither scale nor oil was found; and yet with plenty of water in the boiler the bottom plate was overheated and burned out. I wish to submit to the society a reasonable explanation of this. The horizontal tubular boiler has the heat applied to every foot of its surface of plates and tubes below the water line. The result is that in every part of the boiler steam bubbles are rising, so that there is no place for return circulation. When the boiler is making steam freely the water is evaporated over the plates, and it is impossible for more water to reach the plates promptly. They are overheated and burned. Mr. Stirling went on to state that the greatest heat was at the point where the rupture took place, reference being had to the drawing, Fig. 1. At this point was the most rapid generation of steam and the currents converged at this point. It was, therefore, probable that there was no water in contact with the plate at this point, because of the rapid generation of steam, and burning occurred. This is the point where the most water is needed and where the bubbles are rising freely, but it is impossible for the water to get there from any source whatever. It is not necessary to assume that the plates are at any time heated to a white heat; it is probable that they are overheated and cooled to a gradual extent. I am sure that every member will agree with Mr. Daniels as to the importance of the careful testing of plates. It is apparent that this is not all that is necessary. The choosing of the fuel is important, and it is to the interest of boiler users to select a design that will insure a thorough circulation of water to every point of the boiler to take the place of the water promptly as it is evaporated.

James McBride, in discussion of Mr. Daniels' paper, said that dirt had undoubtedly caused the trouble, and cited experiences of his own in which dirt had played the principal rôle in similar cases.

J. F. Holloway said: This seems to be a guessing match. There is one thing that looks a little suspicious, and that is the thinness of the plate at the extreme point at which it is projected. It was not simply pressure on the inside of the plate at that particular point, because that would not make the plate so thin, and my guess in the matter would be this, that it was a blister or an air bubble in the plate. Of course there are steel makers here who will say that such a thing is not possible.

Geo. H. Babcock said that he thought Mr. Stirling's remarks perfectly just. The other case referred to is quite probable. The dirt will gather at a definite point; it will not spread over the bottom of the boiler, the circulation tending to bring it toward one point, where it will gather in a mass and cause a burning out. If you will examine this piece of iron you will notice that considerable erosion has taken place through the opening.

Professor Denton said: It has been shown that a scale of very small thickness, which would ordinarily escape the attention of a boiler man, would cause this result. I think Mr. McBride's view is very liable to be true.

The next paper, by James B. Stanwood of Cincinnati, considered the

Strains in the Rims of Fly-Band Wheels Produced by Centrifugal Force.

In text-books on machine design are found analyses of the strains in pulley arms due either to the pull of belt, the inertia of the rim, or the centrifugal pull on the arms due to weight of rim, &c. These text-books also state that the strength of the rim is not affected by its thickness as regards centrifugal force; for with an increase of thickness there goes an increase of weight with a corresponding increase of centrifugal force and area of cross section

to resist it. From this reasoning, wheels of good metal, perfectly true and in good running balance, are only limited in speed by a periphery velocity, roughly assumed at about a mile per minute, or 88 feet per second; a speed giving a very low strain per square inch of rim—to wit, about 800 pounds per square inch of rim cross section.

Yet in view of these statements we find wheels bursting at low speed, others running safely at high speed.

Within a few years very large fly-band wheels with wide thin rims have taken the place of fly wheels with square rims and have also been operated at very high speed. The writer knows of one case where the periphery velocity on a 17-foot 9-inch wheel is over 7500 feet per minute.

In band saw mills the blade of the saw is now operated successfully over wheels 8 and 9 feet in diameter, at a periphery velocity of 9000 to 10,000 feet per minute. These wheels are of cast iron throughout, of heavy thickness, with a large number of arms. Who would dare to operate an ordinary 9-foot pulley at that speed?

In shingle machines and chipping machines where cast iron disks from 2 to 5 feet in diameter are employed, with knives inserted radially, the speed is frequently 10,000 to 11,000 feet per minute at the periphery.

Last spring the writer was one of three experts called in to decide upon the cause of a serious fly-wheel accident. From the testimony submitted by a well-known builder of large wheels he was led to investigate a special strain developed by centrifugal force in band-wheel rims. This strain is due to the fact that all materials have elasticity and stretch when under strain. The wheel in question was 22 feet in diameter, 50 inches face, and had a periphery speed of 5000 feet per minute. It was built in sections, as so many large wheels usually are. The segments were secured to arms in such a manner that the segmental joints lay half way between the arms. This construction was criticised by the aforesaid builder, who indicated by a sketch a better method by uniting the segments at the spokes. This formed the starting point for the investigation, which the writer wishes to submit for discussion.

The paper then goes on to state that a thin annular ring, revolving about a central axis, is subjected to a simple tensile strain similar in every respect to that found in a boiler shell. If arms are inserted in the ring, and are supposed at first to have no weight and to be rigid, with no elasticity, their effect will be to pull the expanded ring into its original diameter at the arms. Its outline will then be represented by a wavy line, the radii being longest midway between the arms

But the ends of the arms do not remain rigid; the arms themselves expand longitudinally under the influence of their own centrifugal force, and they are also elongated by the strain outward imposed upon them by the expanding ring. In fact a compromise is effected; the arm stretches out to the ring, the ring yields in toward the arm, and the bending action in the ring depends upon this undeterminate amount. Wheels in halves, if very thin rims are to be employed, should have double arms along the line of separation. The writer presents formulas for calculating the dimensions of the parts of wheels of different designs.

An Analysis of the Shaft Governor

was the title of a paper by F. M. Rites of Pittsburgh. We take the following extracts:

The two terms "degree of regulation" and "rapidity of regulation" are often confounded and misapplied, but the properties of the governor they represent are so distinct that they may be varied independently even in the same governor. The degree of regulation may be defined as the percentage of variation of speed necessary to maintain a unity between the centrifugal and centripetal forces in governor adjustments, corresponding to variations of load or steam pressure. The rapidity of regulation implies its own definition as the speed of adjustment to meet the varying conditions of load or steam pressure. The degree of regulation depends on the rate of variation of the centrifugal force at constant speed with respect to that of spring tension; while the rapidity of regulation depends on the effect of the inertia of the masses that compose the governor.

The degree of regulation is a variation of speed as measured over a considerable interval of time, during which the adjustment of the governor is maintained constant, while the rapidity of regulation deals only with momentary demands upon the governor.

It is perfectly possible to adjust the relation between the centrifugal force and that of the spring to such refinement that perfect isochronism is attained, and yet be so slow of adjustment as to possess no stability even under moderate changes of load, and the resultant racing will be even more violent with a supersensitive regulation.

On the other hand, a governor may be designed to utilize its entire inertia for rapid regulation, without the power to do so on account of the low degree of regulation, so that a governor perfectly designed with respect to its inertia effect will not alone guarantee good regulation, nor does close regulation necessarily imply rapidity of adjustment; on the contrary, it is perfectly possible in a poorly designed governor to oppose the increment of centrifugal force by that of inertia; and for the same reason (opposition to the effect of inertia) the many ingenious devices for increasing the possible degree of regulation are of doubtful utility by acting as obstructions to a rapid adjustment.

The problem of inertia becomes still more complicated by the necessity of distinguishing between the effect of moment of inertia of the weights considered concentrated at their center of gravity, and hereafter to be termed "tangential inertia," and that due to the aggregation of moments of inertia, caused by angular acceleration about the center of support of the particles composing the mass of the weights, and termed "angular inertia."

The actions of these two forces of inertia are here distinguished and described probably for the first time, and it is of the utmost importance that they should be thoroughly understood to be fully appreciated in their application as governor forces. They are both of inertia origin, but the first is generated by the momentary tangential effect about the center of revolution of the shaft, and the other by a varying angular velocity about its center of support and rotation. In other words, the one is a moment of inertia of the concentrated mass about its center of revolution reduced to a secondary moment about its center of rotation and support. The other exists only as a primary moment about its center of support. Again, these may assist or oppose each other, or together unite with or in opposition to centrifugal force. In short, it is possible to ring all the changes of combination of the three forces according to the design of the governor.

The writer then presents a mathematical discussion of the forces acting in the shaft governor, and finally describes a special practical application of the principles discussed.

W. A. Gabriel of Elgin, Ill., described a

New Process of Cutting Cams.

The writer of this paper is engaged in the work of designing small and intricate machinery for the manufacture of parts of watches, and in the course of his experience found it necessary to produce cams of greater accuracy than could be obtained in old and well-known ways. As a result of this the following method of laying out and cutting such cams was devised by the writer, and is made the subject of this paper.

The following is a description of the cam-cutting machines and manner of laying out the forms used therein. It is hoped that the diagrams that form part of this paper will give the reader a clear idea of the scheme.

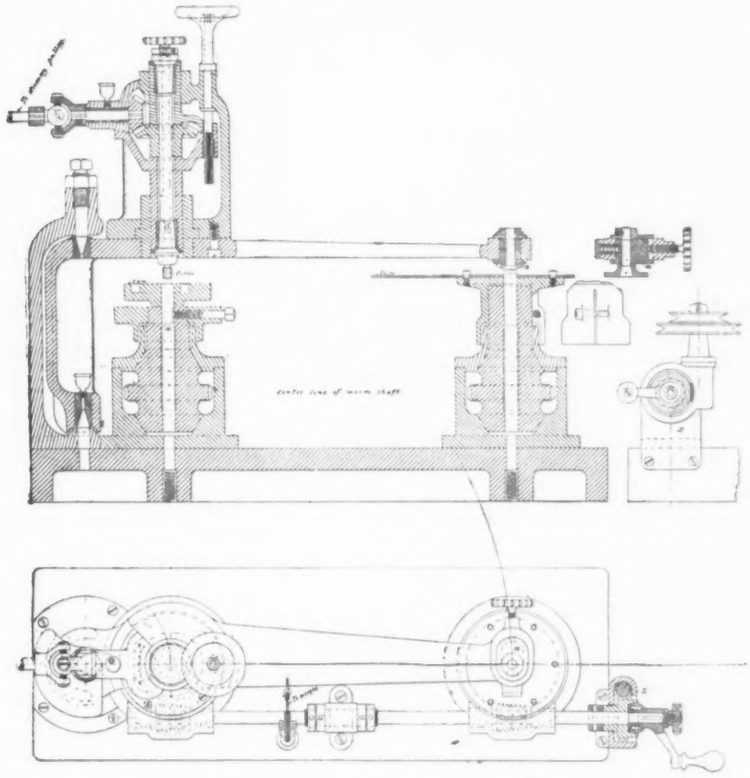
To commence with, a chart of all the cam motions in a machine is laid out similar to a sample diagram shown at Fig. 9, and a position line is drawn across it. From this chart the forms for the cam-cutting machines are made. Figs 10 and 11 were laid out from the chart at Fig. 9. The position line is located on them in its proper place, so that when the form is in the machine the line can be marked on the cams after being cut. The use of this line makes it possible to place all cams in a machine in their proper place at once. The line is marked on the cams from the form while in the machine, after the cam has been cut. A pointer is put in place of the cutter, and another pointer in the place of the roll acted on by the form (Figs 6 and 7). When the position line marked on the form is brought around to the pointer at that place, the pointer in place of the cutter is made to mark a line on the cam. When all the lines marked on the cams in a machine are in a line parallel with the cam shaft, they are ready to be secured to it. It will be noticed by referring to the drawings of the machines that the levers transmitting motion from the form to the cutter are multiplying. In this case it is five to one, and the form, of course, must have a rise or throw five times that of the cam being cut. This is done so that errors of workmanship in making the form will be reduced in the cam and more perfect work produced.

In some cases the form is laid out on a board covered with paper, and is then sawed out, taking care not to run over the line. It is then trued up with a file, and is ready to use in the cam-cutting machine. But in cases where great accuracy is necessary, the form is laid out on sheet brass about $\frac{1}{10}$ inch in thickness, and as metal will keep its form unchanged for any length of time, a cam can be reproduced the same as the original at any time.

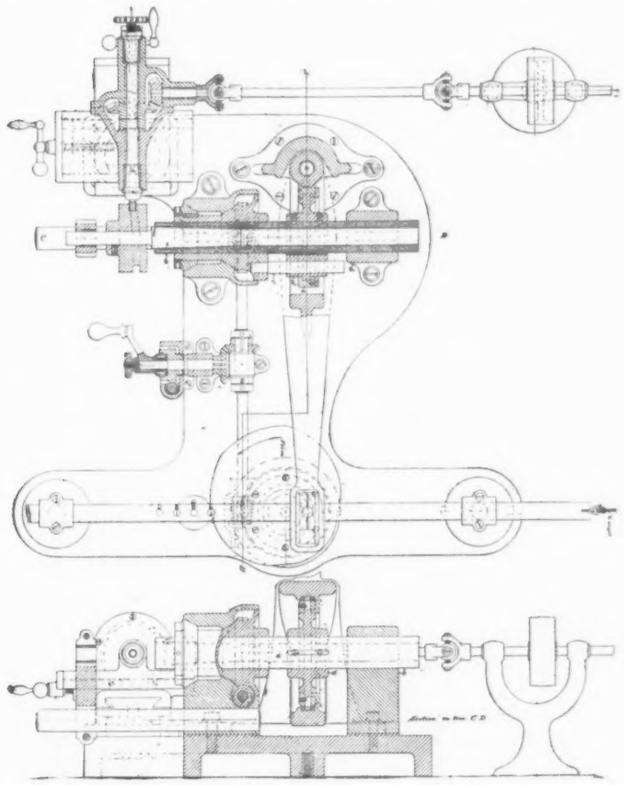
An instrument to facilitate the laying out of forms on metal is shown by Fig. 14. It consists of an ordinary tubular beam compass, with strong points to scratch a plain line on the metal, and an attachment at the adjusting end that will enable it to be set to $\frac{1}{1000}$ inch of any required distance. A steel scale with inches, tenths, and hundredths on it is used in connection with the compass. To operate it the point on the sliding head is run out to nearly the distance required, and the points are set in the divisions on the scale. A magnifying glass is used to see that the points rest in the center of the lines, the adjusting nut being used to bring that about. The part of the nut carrying the divisions can be turned independently of it. It is then set to zero, and if the distance calls for several one-thousandths of an inch, more or less, it can be obtained by turning the nut to the right division. The compass is then set ready to mark a line on the form.

The sheet metal on which the form is laid out is first prepared by drilling a hole near its center, the size of the center pin in the spindle on which the form turns in

the machine. The hole is then filled with a small brass plug having a fine center point in it. This insures the hole being in the right place when the form is finished.



Figs. 4 and 5.—Machine for Cutting Groove in Side or Face of Cam.



Figs. 6 and 7.—Machine for Cutting Groove in a Cylinder Cam.

NEW PROCESS OF CUTTING CAMS.

After the form is outlined on the brass plate it is sawed out with a band saw for metal and is then placed upon a small table and finished with a file. A fixture is attached to the table for holding the file perpendicular to the edge of the form. It is then ready to be put in the cam-cutting machine.

I will now proceed to describe the machine that cuts a groove in the side or face of a cam.

This machine is shown by Figs. 4 and 5, and consists of a strong bed plate, on which are placed two upright spindles to carry the cam to be cut and the form. Over them, and pivoted at one end, is a strong lever, so placed as to make a proportion of five to one between the cam and form.

At one end is a roll to act on the form. Over the cam spindle is the cutter spindle, with its driving gears. Adjustment is provided up and down. The cutter spindle is driven through bevel gearing by a countershaft and universal couplings. This allows for all necessary movements of lever and cutter.

Both cam and form spindles are turned by worm gears with the same number of teeth in each, and are turned in the same direction by worms which are made tapering, so that side shake can be taken up.

The worm shaft can be turned either by hand or power, as is clearly shown by the drawings. The form for this machine must be just the shape of the space inclosed by the groove in the cam, and must be five times actual size. This is necessary on account of the roll and cutter being mounted on the lever. The roll should be just five times the size of the finishing cutter. A small slide in the end of the lever, marked *a* on plan, Fig. 5, provides adjustment so that the sides of the groove can be finished with a fine chip, or trimmed up after being worn so badly as to require it.

The lever carrying the cutter and roll is held up to the form by a weight suspended at the end of a cord, which passes over a pulley swiveling at the top of a column, and attached to lever, as shown on plan, Fig. 5. It can be seen that the machine just described is quite simple and will do excellent work.

The machine for cutting a groove in a cylinder cam, shown in Figs. 6 to 9, is more complex, but will do work as perfect as the former. In this machine the cam being cut is moved endwise by the form as it turns, and whatever shape the form has is given to the cam, as perfectly as in the other machine. The roll acted on by the form is carried by a bar, which moves parallel with the spindle carrying the cam to be cut. Motion is transmitted from the bar to the cam spindle by a lever, which is pivoted so as to give the same proportion of movement as in the former machine. The worm shaft can be turned by hand or power. Means are provided to take up any side shake between worm and gear. The cutter and its driving gears are mounted on a compound slide, so that it can be adjusted to position with ease. A support is provided for the outer end of arbor carrying the cam, to prevent chattering when taking heavy cuts

The spindle *a* is free to move endwise in the outer spindle, of which the worm gear is a part, and also in the back bearing *b*. The driving pin *c* is fast in the worm gear spindle; and passes freely through a disk, *d*, which is keyed fast to the sliding spindle *a*. A ring, *e*, which cannot turn encircles the disk *d*, and in it are pins pivoted in small slides in the lever. Adjustment is provided to take up any shake in pins or slides. This arrangement is necessary on account of the foreshortening of the lever. In this machine it is not necessary to have the form just five times the size of the space inclosed by the groove, as in the former machine; but the rise or throw must be. The form ought to be as large as convenient in order to avoid having too steep a rise for the roll to overcome. A number of holes are provided in the bar carrying the roll, to assist in adjusting it properly. A weight at the end of a cord, attached to the bar, keeps the roll up to the form while cutting the cam. Means are provided to enable the form to be turned independently of the spindle. This is useful in starting to cut the cam.

A hole is first drilled in the cam blank, to start the cut. The hole is brought opposite to the cutter by turning the blank on its spindle, then the form is turned to adjust endwise. The machine is then set ready to cut the cam. The position line is marked on the cam after being cut, to avoid any chance of error from its slipping on the arbor.

In many cases the pin working in the groove of a cam is secured in the end of a lever working on a fulcrum. If the radius of the lever be short, and the throw of the cam be great, a serious cramping of the pin may take place, on account of the foreshortening of the lever. In Figs. 12 and 13 is shown a way whereby the cutter may be moved in cutting the groove in a cam, in the same way that the pin itself would move, on account of the foreshortening of the lever. In order to simplify this problem, the pin should not work below the center line of the cam. To set this device the cam blank and form should be turned to exactly the center of the throw, and then, with the rock-shaft *a*, in the position shown, the adjustable arms *bb*, Figs. 12 and 13, are moved up to contact with the blank, one on each side. The bar *d*, on which arms *bb* slide, is supported at each end by yokes, *cc*, which in turn slide on round bars, *ee*. At the outer end of bar *d* is a stud, *f*, to which is pivoted a connecting rod, *g*. One end of this rod is adjustable in a slot in a curved arm which is pinned fast to the rock-shaft *a*. At the opposite end of the rock shaft, and within the vertical slide *h*, is a short rocker arm carrying a flatted pin, *i*, which slides in a suitable slot in slide *h*. As the cam is being cut, its movement endwise causes motion to be imparted to the mechanism just described; and that in turn causes the vertical slide *h*, carrying the compound slides and cutter spindle, to move up and down. In order that the amount of motion up and down shall equal the foreshortening of the lever and pin which is to work in the cam, it is first found by measurement of the drawings of the machine in which the cam is to work. Then, by means of a micrometer screw at *j*, and the adjustment of the connecting rod in the slot in the curved lever, the machine is set to an equal amount, and then is ready to cut the cam.

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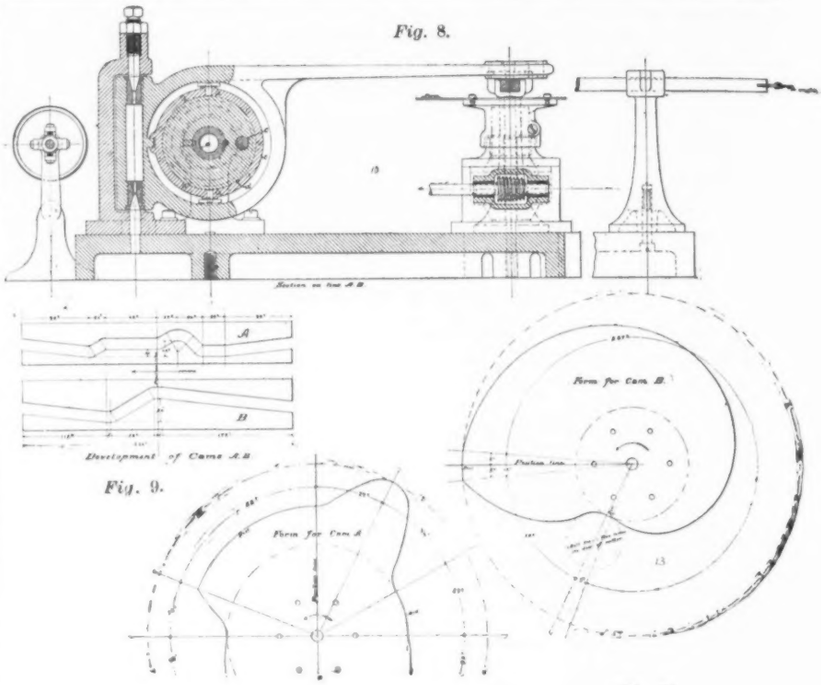

Fig. 8.

Fig. 9.

Fig. 11.

Fig. 10.

Cam Diagrams.

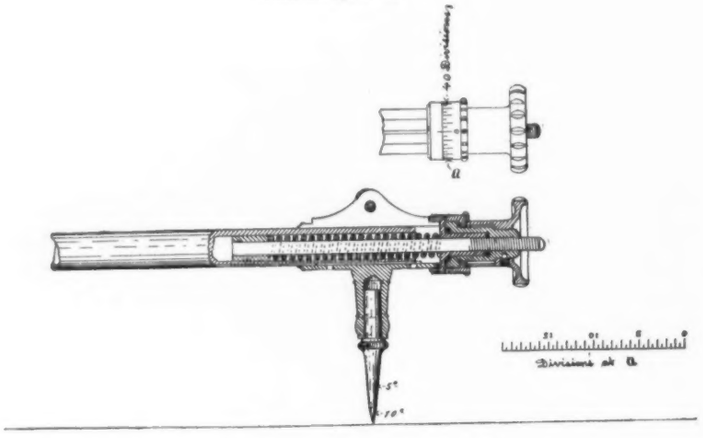

Fig. 14.—*Instrument for Laying Out Forms.*

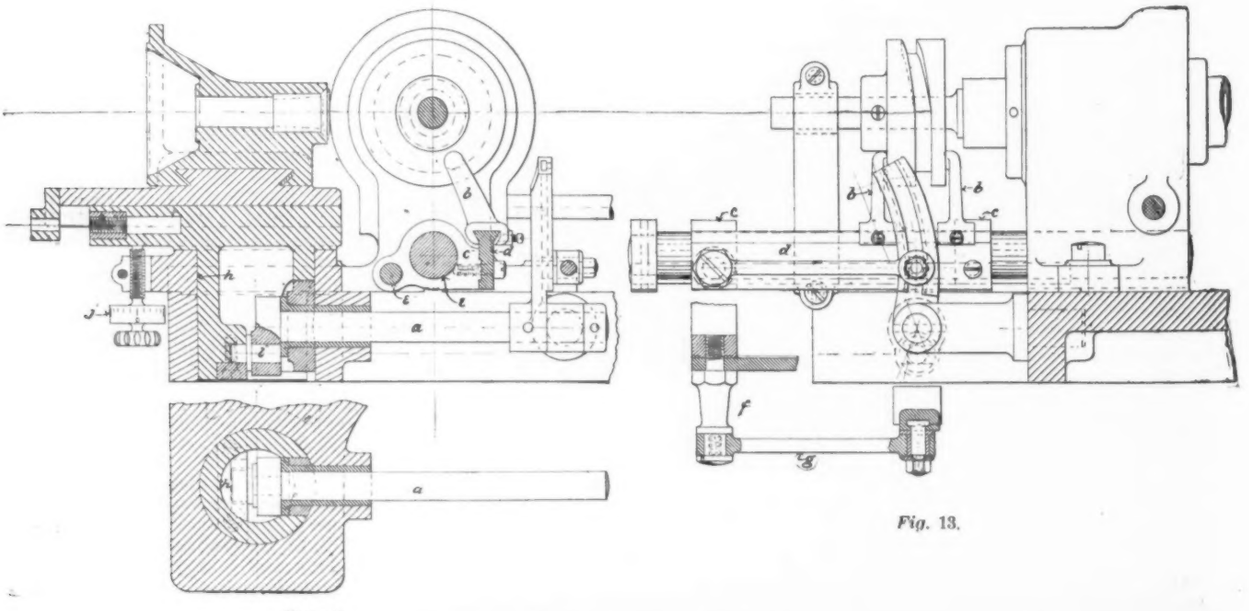

Fig. 13.

Fig. 12.

Moving Cutter in Groove of a Cam.

NEW PROCESS OF CUTTING CAMS.

pin working in a cam cuts much of a figure, as in most cases it can be corrected by rounding the pin a little. But some might think it ought to be provided for in a cam-cutting machine, and for this reason the writer thought best to describe a way by which this objection might be overcome.

Two machines, on the principle of those described in this paper, have been in successful operation for the past three years, which produce work giving entire satisfaction.

A Simple Difference Machine

was described by George Richmond of New York. The foundation principle of the machine will be understood from the following:

For the purposes of illustration, we will take as a typical series that of cubes—namely, in which each term is the cube of the number of the term:

a	*b*	*c*	*d*
1			
	7		
8		12	
	19		6
27		18	
	37		6
64		24	
	61		6
125		30	
	91		
216			

From five terms we derive the successive orders of differences *a*, *b*, &c., the fourth difference disappearing. Hereafter the series can be continued by simple addition, as shown by the last diagonal line, thus:

$$0 + 6 = 6$$
$$6 + 24 = 30$$
$$30 + 61 = 91$$
$$91 + 125 = 216$$

By this process we have obtained the sixth term (216) of the series, and the set of differences, 0, 6, 30, 91, necessary for calculating the seventh term. The process of calculating this will give us the differences necessary for the eighth term, and so on *ad infinitum*.

It would perhaps seem that without a machine this process of continuing a series is sufficiently easy. In practice, however, the series are not of the simple nature of the one given as a type. The last difference is rarely absolutely zero; and, in order that the series finally obtained shall be accurate to a given extent, it is necessary to take numbers with a very large number of digits, both in the first terms of the series and the differences obtained therefrom. If the table is required to be accurate to six figures, all beyond the sixth digit will be dropped in recording the final results. To secure the accuracy of these results, if the table be a long one, it may have been necessary to work with 10 or even 20 digits. The arithmetical work would then be more formidable than the independent calculation of the individual terms of the series to the required degree of accurcy.

In its general aspect the machine is similar to the typewriter, the keys being numbered from 0 to 9.

The process will be intelligible if we follow it through one complete cycle. The totalizer, which is some form of adding mechanism, being set at 00000, we take our place at the machine. The only number in sight is the 6 on the middle tape. This we proceed to write by striking the key marked 6. As a result, the carriage moves to the left one notch. As a further result, the number 6 has been placed on the totalizer and printed on the difference tape, as seen below. At the same time the number 6 has been printed on the verification tape. Moving the carriage back to its initial position (as we should do with a typewriter to commence a new line), we now find 24 brought into view. On writing this, 24 will appear on the verification tape, but 30 on the totalizer, viz.: 6 + 24, the effect being to add 24 to the 6 already on the totalizer. This number 30 is duly printed on the difference tape, where it appears below the 6 already printed.

In the same manner we print the numbers 61 and 125 as they successively appear in the slit, in consequence of which 91 and 216 are printed on the difference and verification tapes. In the next operation the machine subtracts from the totalizer the amount written, and records it on the recording tape. By the movement of the difference tape the row of 00000 would now be in view; the slit, however, is raised so as to expose the number 125, which is therefore written off a second time. This time, however, the result is to produce (by subtraction) a row of 0000 on the totalizer, which are printed on the difference tape, being the row below 216. This completes the cycle, and the effect is that the first result belonging to the series is printed on the recording tape. The complete operation, though requiring rather a lengthy description, would be actually performed in a few seconds. It will be observed that the difference tape now contains the set of differences 6, 30, 91, 216, necessary for the next operation. These are written off in quick succession as they appear in the slit, with the result that 216 takes its place as the second result on the recording tape.

The calculation of tables by the method of finite differences is thus reduced to purely mechanical work, which, with a little practice, can be performed with great accuracy and rapidity. With ordinary care the verification tape should insure absolutely correct results. Should an error occur its position may be readily located, and only the work following the first deviation on the verification tape is lost.

An Interesting Incident During the Thursday Morning Session.

Mr. Holloway said: When this society first organized, among its earliest members was a gentleman who, during its existence up to the present time, has taken a great interest in it, but who, unfortunately, owing to ill health, has been unable to be with us to any great extent, and is therefore comparatively a stranger to the majority of our younger members. This gentleman, I am very happy to say, is with us to-day. His interest in the society, I am quite sure, is as great as that of any of us, but for the reasons I have mentioned he has not been with us as much as he would like to have been. He is intimately connected with our history. With this short and brief and imperfect presentation of the subject, I want to ask the gentleman to do me and our president a favor, and to do yourselves a credit in doing what I am sure you will all agree to do, and what I am sure our friends will do on the other side of Mason and Dixon's line. I ask you all to rise, gentlemen, in recognition of Thomas F. Rowland, the builder of the "Monitor."

Mr. Rowland made a few remarks in reply, thanking the members for their kind courtesy and declining to review the story of the "Monitor," as it had been so often rehearsed.

A discussion of

The Strains in Lathe Beds

was read by G. W. Bissell of Ames, Iowa. The lathes experimented with were one 16-inch Reed, one 16-inch Washburn, and one 20-inch Fitchburg. The forms of the beds are exhibited in the drawings, Figs. 15, 16 and 17. The 16-inch lathes had beds 8 feet long, and the 20-inch lathe had a bed 12 feet long. All were supported by the familiar leg castings, one under each end. They are part of the equipment of the machine shop of the Department of Mechanical Engineering of the Iowa Agricultural College.

The observations and the derived data of the tests made by the writer upon these lathes are given herewith: Size of reference plane, 10 x 36 rectangular.

Strains in Lathe Beds.

No. of observation.	Conditions,	Readings. Reed, 16 in.	Washburn, 16 in.	Fitchburg, 20. in.
	STRAINS PRODUCED BY EXTERNAL CAUSES			
1	Wedge under front leg, tail stock end	0.0769	0.0818	0.0760
2	Wedge under back leg, tail stock end	0.1370	0.1280	0.0099
3	Difference between 1 and 2	0.0601	0.0462	0.6610
4	Mean of 1 and 2	0.1069	0.1049	0.0429
5	Normal position of lathe on floor	0.1091	0.1034	0.0256
6	Probable actual distortion in normal position, difference between 4 and 5	0.0022	0.0015	0.0173
7	Minimum value of 6		0.0015	
8	Maximum value of 6			0.0173
9	Jack screw under middle of leg casting	0.1056	0.1061	0.0456
10	Difference between 4 and 9	0.0013	0.0012	0.0027
	STRAINS PRODUCED BY TORSION OF PIECE BETWEEN CENTERS.			
11	Normal condition, both feet of leg casting on floor	0.1895	0.1037	0.0244
12	Full belt power, both feet of leg on the floor	0.1968	0.1074	0.0029
13	Jack screw under middle of leg casting, no strain from belt	0.1916	0.1073	0.0598
14	Jack screw support, full belt power	0.1946	0.1150	0.0710
	ERRORS OF CHUCKED WORK.			
15	Front reading, wedge under back leg	0.2836	0.3169	0.1454
16	Back reading, wedge under back leg	0.2828	0.3146	0.2038
17	Difference between 15 and 16	0.0062	0.0030	0.0584
18	Front reading, wedge under front leg	0.2942	0.3236	0.2005
19	Back reading, wedge under front leg	0.2782	0.3056	0.1935
20	Difference between 18 and 19	0.0160	0.0180	0.0070
21	Average difference of front and back reading	0.0126	0.0100	0.0327
22	Spindle aligned, difference reduced to	0.0004	0.0005	0.0002
23	Spindle aligned, reading with micrometer and apparatus used in 1 to 14	0.1161	0.1269	0.0636
24	Difference between 9 and 23	0.0105	0.0208	0.0180
25	Maximum variation in diameter of chucked work per inch of length	0.0021	0.0024	0.0077

REMARKS.—The observations (24) indicate, first, the degree of accuracy attained in the original alignment of the lathe; or second, the amount of wear to which the parts interested have been subjected; or third, and more probably, combined effect of wear and faulty alignment.

A hole is first drilled in the cam blank, to start the cut. The hole is brought opposite to the cutter by turning the blank on its spindle, then the form is turned to adjust endwise. The machine is then set ready to cut the cam. The position line is marked on the cam after being cut, to avoid any chance of error from its slipping on the arbor.

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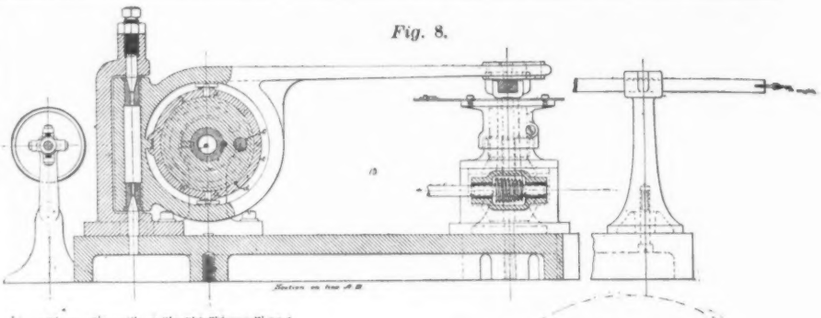


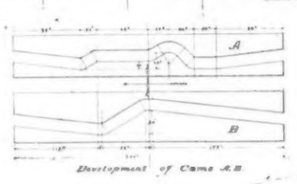
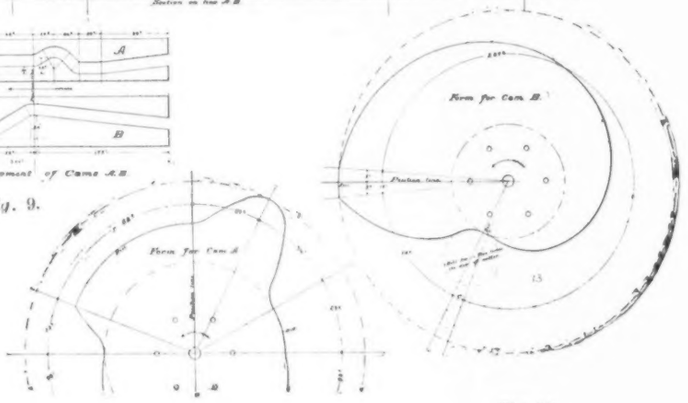


Fig. 9.



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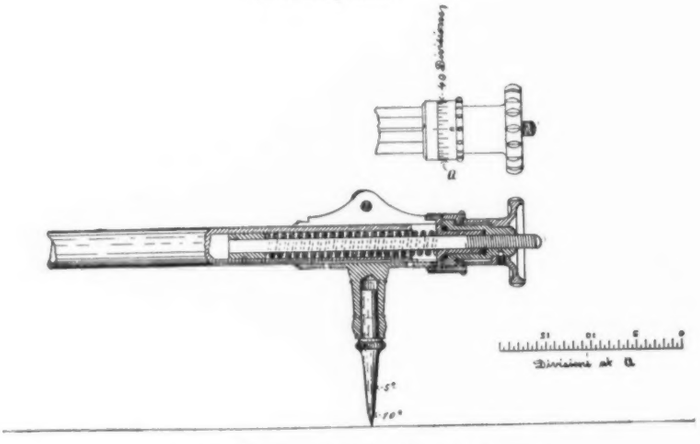

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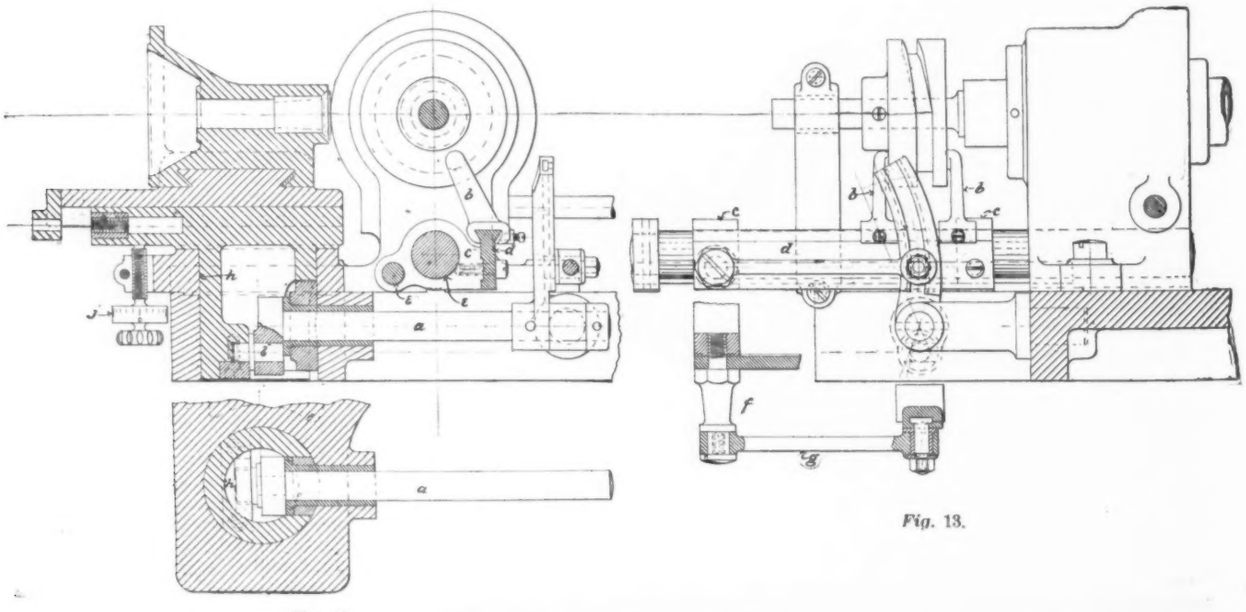

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NEW PROCESS OF CUTTING CAMS.

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From five terms we derive the successive orders of differences *a*, *b*, &c., the fourth difference disappearing. Hereafter the series can be continued by simple addition, as shown by the last diagonal line, thus:

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REMARKS.—The observations (24) indicate, first, the degree of accuracy attained in the original alignment of the lathe; or second, the amount of wear to which the parts interested have been subjected; or third, and more probably, combined effect of wear and faulty alignment.

Experiments to measure the tool pressure were made with a modified form of Morin dynamometer, shown in Fig. 18. The lathe used was a 16-inch Reed. A preliminary test was made to determine the maximum effort of the belt in inch-pounds of turning moment upon the spindle. To do this a bar of steel $1\frac{1}{2} \times \frac{1}{2}$, about 5 feet long, was placed in a four-jaw chuck in its place upon the spindle, so that it extended horizontally transversely to the axis of the spindle. Under a point of this bar, 2 feet from the center of the spindle, was fixed a knife edge support resting upon a platform scale. With the back gear in and the belt upon the longest step of the cone pulley, the belt was driven to the point of slipping and the load on the scales noted. Tare was determined and allowed for. Several observations with varying leverages were taken, and the average of these showed a moment of 2712-inch pounds. This quantity was used in calculating the dimensions of the leaf springs of the dynamometer. The width of the belt was $2\frac{1}{2}$ inches.

Experiments were made upon cast-iron cylinders, $2\frac{1}{2}$ inches diameter and 10 inches long. These were reduced by roughing cut to 2 inches. Three rates of feed are provided by the lathe, and these were used in the experiments. For each rate of feed cards were taken for depths of cut varying from $\frac{1}{32}$ inch to $\frac{1}{4}$ inch, or $\frac{5}{16}$ inch by $\frac{1}{32}$ inch. The amount of metal turned off was ascertained by weighing before and after the cut. The cutting speed, reckoned from the initial diameter of 2 inches, was constant, about 30 feet per minute, the spindle making 59 *r.p.m.*

Below are given the results of the experiments :

Depth of cut. Inches.	Feed per revolution. Inches.	Weight in pounds. Metal removed per cutting foot.	Pounds pressure on tool point.
5-16	0.0083	0.0065	466.8
9-32	0.0083	0.0059	413.9
¼	0.0083	0.0055	378.7
7-32	0.0083	0.0047	343.5
3-16	0.0083	0.0042	299.4
5-32	0.0083	0.0037	255.4
⅛	0.0083	0.0032	237.8
3-32	0.0083	0.0025	184.9
1-16	0.0083	0.0015	140.9
1-32	0.0083	0.0010	61.6
¼	0.0128	0.0084	642.9
7-32	0.0128	0.0080	590.1
3-16	0.0128	0.0076	537.2
5-32	0.0128	0.0061	510.8
⅛	0.0128	0.0053	440.4
3-32	0.0128	0.0040	369.9
1-16	0.0128	0.0030	229.0
1-32	0.0128	0.0011	105.6
¼	0.0172	0.0113	731.0
7-32	0.0172	0.0103	651.7
3-16	0.0172	0.0092	607.7
5-32	0.0172	0.0072	537.2
⅛	0.0172	0.0056	413.9
3-32	0.0172	0.0046	343.5
1-16	0.0172	0.0031	255.4
1-32	0.0172	0.0016	132.1

DISCUSSION.

In discussion of this paper Oberlin Smith said that the lathe was evidently gotten up on the fiddle principle. He showed on the blackboard how he would strengthen the lathe. He would do this by making the bed a solid casting, perhaps forming a small central opening for the passage of chips.

He spoke in favor of heavier structures and against the practice of manufacturers in trying to save metal by the sacrifice of rigidity.

W. S. Rogers cited his experience in trying to sell a lathe in competition with several other salesmen. The buyer desired a heavy lathe and he talked weight, while the others talked design and workmanship. His rivals said their lathe weighed 12,000 pounds; he said his weighed 18,000 pounds. He argued with the buyer that he was getting the stuff cheap, considering the amount of metal involved. He did not tell him of certain defects in the lathe, such as the fact that it would turn taper without setting the carriage over. He talked weight and that argument sold the lathe. If a solid construction, such as advocated by Mr. Smith, were desirable, why not make bridges and similar structures after the same pattern?

Mr. Smith said that Mr. Rogers was doing exactly what all the other people were

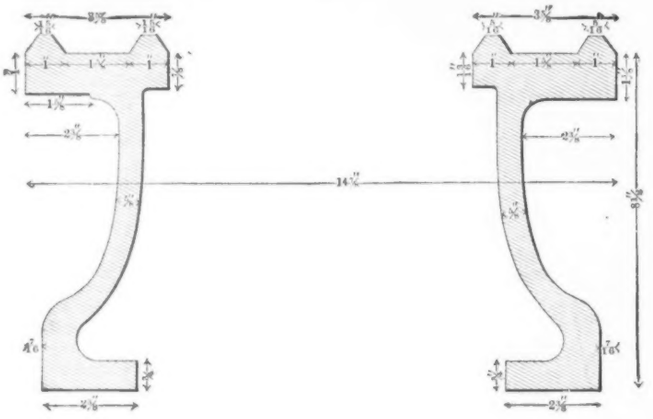

Fig. 15.—Cross Section of 16-Inch x 8-Foot Reed Lathe.

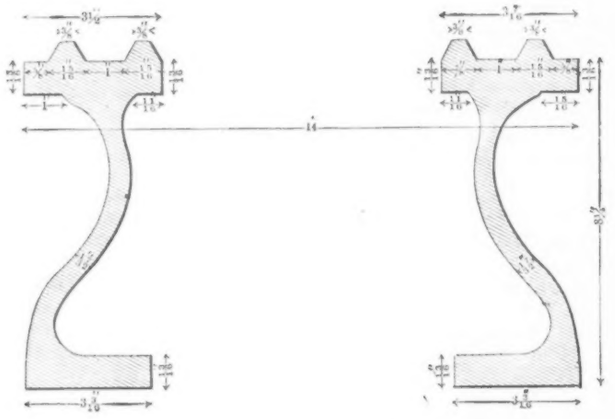

Fig. 16.—Cross Section of 16-Inch x 8-Foot Washburn Lathe.

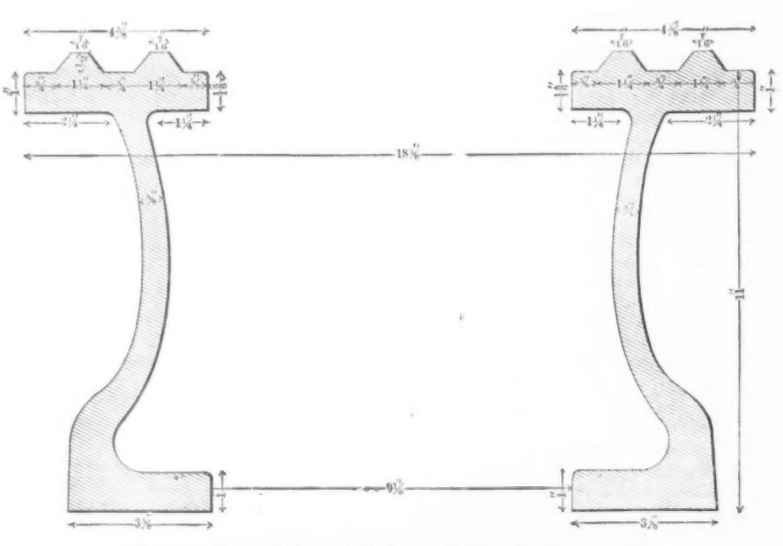

Fig. 17.—Cross Section of 20-Inch x 12-Foot Fitchburg Lathe.

STRAINS IN LATHE BEDS.

doing—using light lathes. What we want is the anvil principle, a mass to take up vibration.

Samuel Webber of Charlestown, N. H., reported a series of

Tests of Driving Belts,

Giving in tabulated form the results obtained. The belts tested were (1) a 6 inch Schieren link, (2) a light Page link, (3) a Schieren perforated belt, (4) a light double leather Eureka dynamo belt, (5) the same slotted, and (6) a Page cotton leather belt. The coefficient of friction with the first varied from 0.294 to 0.417, the load varying from 11.72 to 24.31 horse-power and the speed from 1713 to 2272 feet per minute. In the second the coefficient of friction was from 0.282 to 0.396, the load from 14.55 to 24.31 horse power and the speed from 1452 to 2389. In the third the coefficient of friction was 0.255 to 0.391, the load 13.64 to 25.52 horse power, and the speed 1705 to 2329 feet. In the fourth the coefficient was 0.330 to 0.420, the load 12.9 to 26 96 horse-power, and the speed 1867 to 2329 feet. In the fifth the coefficient was 0.320 to 0.586, the load 12 to 33.75 horse power and the speed 1885 to 2693 feet. In the sixth the coefficient was 0.428 to 0.570, the load 17.20 to 35 7 horse-power and the speed 1946 to 2889 feet. The percentage of slip was 2 to 33, 7 to 19, 2 to 11.03, 2 to 14, 2 to 9.5 and 1 to 14 respectively.

A paper by W. F. Durand of Ithaca, N. Y., on

The Limit of Propeller Efficiency as Dependent on the Surface Form of the Propeller

Shows that the limiting efficiency of the element of the surface of a propeller, working under any given conditions, is an absolute geometrical quantity, depending solely on its direction and motion, and on the motion of the ship.

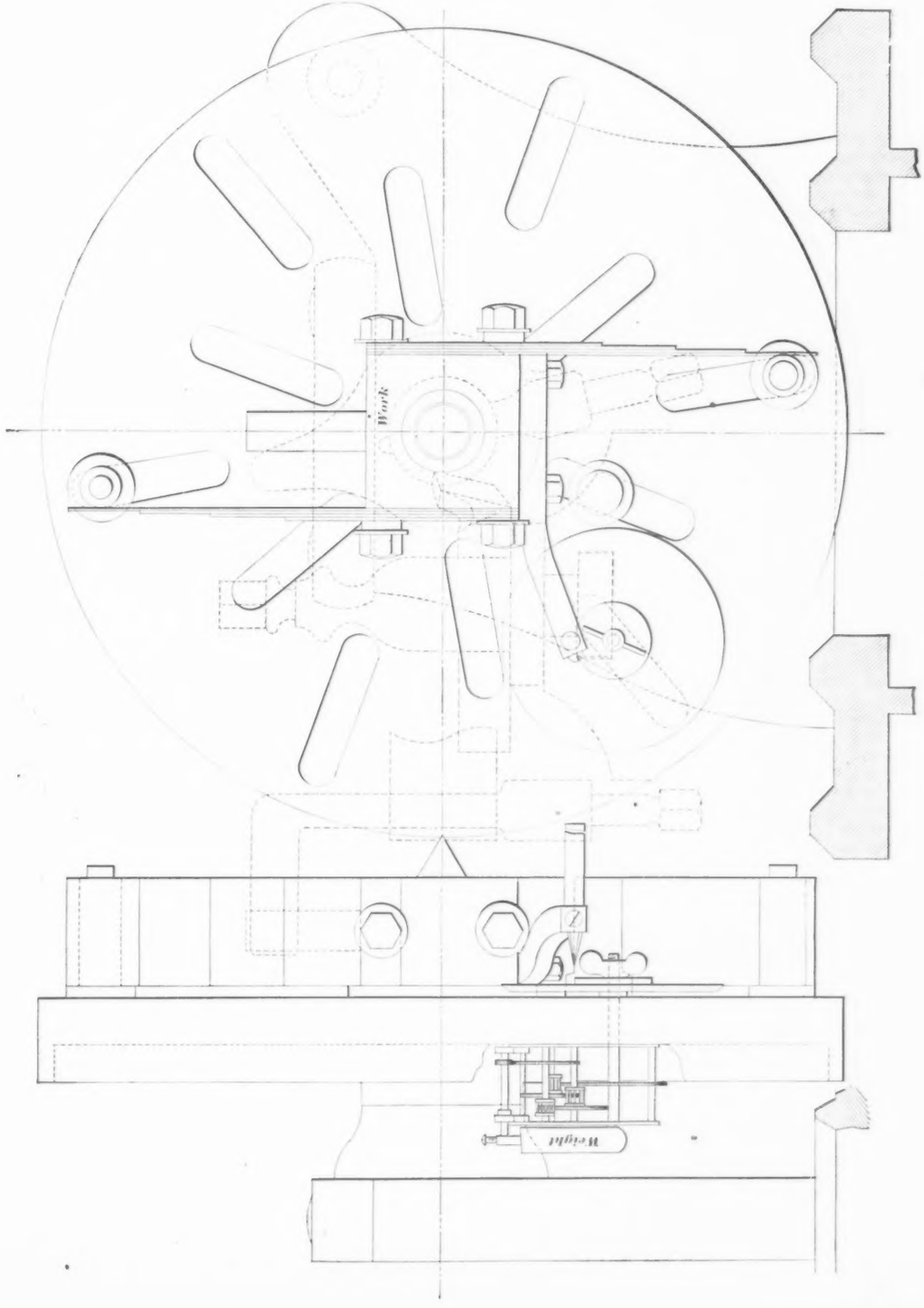

Fig. 18.—The Morin Lathe Dynamometer.

STRAINS IN LATHE BEDS.

That the limiting efficiency of an entire propeller, composed of helicoidal surfaces of the same uniform pitch, is equally simple and definite.

That the limiting efficiency of propellers in general, whether considered as surfaces not truly helicoidal, or as solids such as are actually used, depends on the

additional consideration of the distribution of work over their surfaces. The latter, being a subject of great complexity, and depending on the ship as well as on the propeller, does not admit of general analytical treatment. It is shown, however, that certain limits may usually be laid down between which the efficiency in any given case must lie; and in the case of solids, as actually used, it is shown that such suppositions as can be made lead to the natural conclusion that thickness in general is detrimental to efficiency.

The first topical question considered was,

How Can the Present Status of the Engineering Profession be Improved?

H. F. J. Porter of Chicago, in a written discussion, said in part that the present status of the engineering profession is not what could be desired is evident from articles which appear in our scientific press bearing upon that and allied questions. That there is a lack of professional etiquette among its members, such as is observable in the older professions, is brought to our attention by speakers and writers upon the ethics of engineering. The demand for a higher grade of engineer was responded to only in 1840, when the Rensselaer Polytechnic Institute at Troy, N. Y., opened its doors and began to turn out "civil" engineers. This term had recently been coined to distinguish those engaged in general practice from "military" engineers, whose paths lay in the direction of warfare. For 20 years this school alone supplied technically educated men to the country. Other schools of engineering were founded, yet it was not until 1860 that students began to graduate from the engineering departments of Dartmouth, Union, Harvard and Yale Colleges and Michigan University. It is evident that the demand must have far exceeded the supply, and that the ranks were still recruited from the large body of practical men, who thus had a motive offered to stimulate their ambition. The technical courses compared with those of the present day were very crude.

The writer thought that good work in this direction could be performed by the Congress Auxiliary having in charge the meeting of engineers to be held at the Columbian Exposition.

After the congress has adjourned, the committee, with its strong Executive Board, could be made perpetual in its nature though changing in its personality. Its duties might be those of a Board of Regents embodied with power to confer titles for merit. Such a board, composed of practical men of the world, would be capable of judging what a man should know in order to bear a title. It should endeavor to bring about a unity of method among the schools as to the education of the engineer, so that a degree given on graduation would mean just what it says, and subsequently, after a term of practice, and after passing an examination, a title could be conferred by the board or its authorized representatives in each State, practically licensing the recipient to practice. Nor would it be necessary to attend a technical school to obtain a title; the self-taught genius, on proving himself capable, would be awarded one as well.

Another topical question was

Is the Weaving Shed Design the Best Form of Construction for a Machine Shop?

Prof. John E. Sweet of Syracuse, N. Y., described the design of his own works, and pointed out the advantages. In many respects the weaving shed plan—that is, a one-story structure in sections, separately roofed, with the north sloping side of glass—has advantages. As to ventilation, in its simplest form it may be inferior, but the ventilation is easily controlled when the problem is once fairly attacked.

Common and fashionable as is the salt block construction—that is, a central high section with a gallery on either side—this form, when used in a shop so small that one foreman has control of all the machinery, has this disadvantage, that he has to "see saw" across from side to side, worming his way through the erecting section, whereas, with the erectng floor at one side the machine tools are concentrated. With a small shop, too, the climbing up and down stairs is not only a nuisance, but absolutely costly. Things can be moved in an elevator very cheaply, but carting, loading, unloading, and carting again, spoils the economy. It is doubtful if there is any saving in two or more storied shops, except in real estate, and when as much ground has to be left idle to get light as is covered by buildings, then the saving in real estate is small, unless the buildings are more than two stories in hight.

The advantage of the one-story weaving shed roof plan is that the building can be extended to any length in either direction, and to any width in one direction, without interference with light, with advantage in heating, and with the advantage of having everything on one floor, and that floor a solid one. The trouble apprehended from ice, snow and water has no foundation in fact, and, if dealt with in the way described later, need not give one a moment's anxiety.

The section for traveling cranes can be of any hight and width, without interfering with the weaving shed structure or light, by placing it on the south side.

While there is getting to be some really genuine permanent foundation building done in this country, it is mostly confined to the larger commercial cities, and has

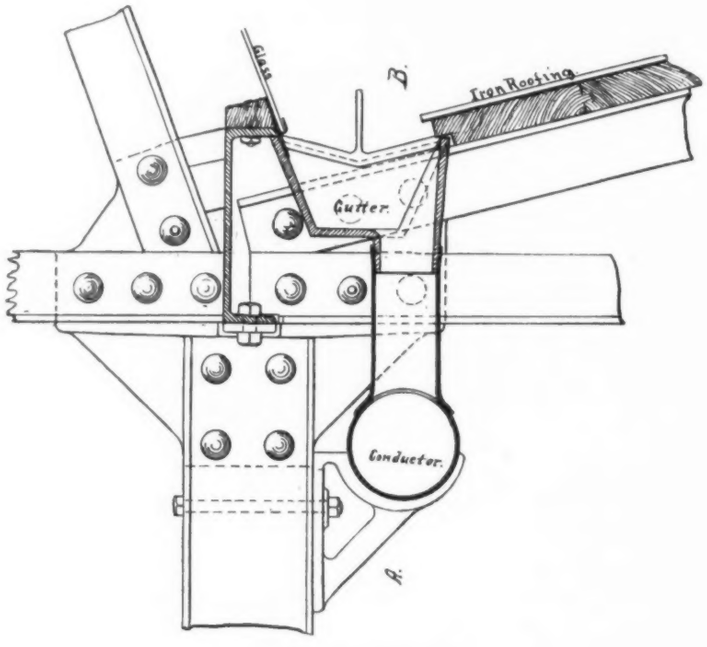

Fig. 19.—Cast Iron Gutter.

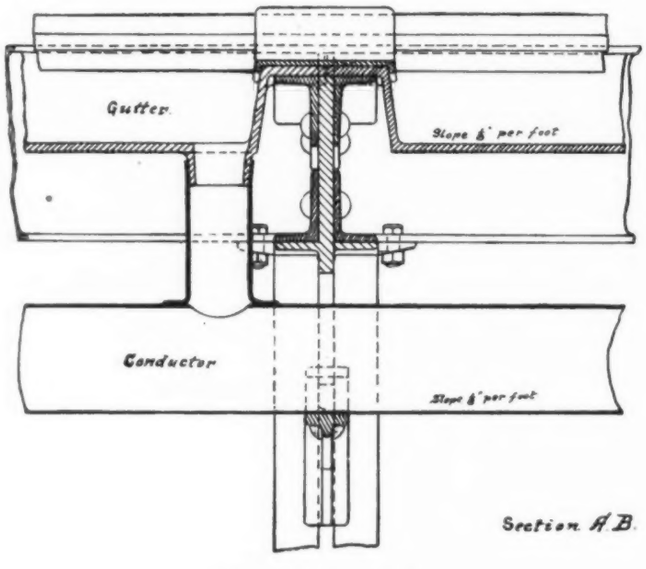

Fig. 20.—Cast-Iron Gutter.

WEAVING SHED DESIGN.

not as yet found its way into the workshops or small towns.

The principles are easy to understand. If the earth throughout the entire structure has equal sustaining power, then the area of the foundation under the different parts should be in proportion to their loads, and the center of the foundation should be directly under the center of pressure. Or, to emphasize the ideas, it is just as detrimental to put too much foundation under the light parts of a building as too little under a heavy one, and worse to have a load rest on one side of a wide foundation than on the center of a too narrow one.

In the locality where the writer resides it is as impossible to get these simple rules into builders' heads as it is impossible to get them executed, or a decent brick wall built. The foundations stand when built directly at variance with right, and brick walls stay up when they ought to tumble over, seeming to depend more on force of habit than the strength of the mortar.

Machine shop floors are a problem, and while those made of dirt, like some of the French ones, seem to last the longest, they are hardley satisfactory; neither are the English brick floors. The following, used in the works of the Straight Line Engine Company, is believed to be better than most of the floors heretofore constructed. The earth was excavated to a depth of 27 inches below the floor line, and rolled with a heavy roller, the soft places filled, and again rolled and leveled. Building stones of the cheapest sort—that is, stone too poor for foundation walls—were dumped on the ground, and men set to sorting the largest pieces and closely packing them on the ground; a strip of 2 or 3 feet of this work was kept in advance of the other filling, so as to insure its solid character. Upon this was a layer of the smaller stone, then broken stone, coarse gravel, fine gravel, and lastly, sand. There is no other possible way in which each grade can be made to retain its place, except by reversing the process and putting the larger above the smaller. If mixed indiscriminately, the fine will work to the bottom and the coarse come to the top. By following the plan given, a solid foundation is secured, upon which is placed nothing but 2-inch hemlock plank running one way, with a 1 inch planed and jointed, but not matched, floor running the other way. The advantage of the thin top is that when there is a hole worn through, it is but 1 inch deep at the most, and the plain strips of uniform width make it easy to repair. This makes a floor on which anything can be set anywhere, except the largest of the machine tools requiring separate foundations.

Some accounts of the English practice give 16 feet as the width of spans or bays, but in the works above mentioned 32 feet is used, 8 feet being the unit upon which the building is constructed. In a more extended plant 10 or 12 feet would be proper. The posts are 8 feet or 16 feet between centers, and all the roof trusses 8 feet. The roof is simply 1½-inch pine plank, 16 feet long, planed and matched, planed side down, nailed to thin strips of basswood riveted between the two angle irons which form the rafters, covered with ribbed, not corrugated, iron; and the flat roof over the traveling crane section is the same, except the gravel roof.

In the construction of the posts and roof, by making each member of two pieces ⅝ or ¾ inch apart, between which bolts can be passed, a convenient means is at hand to fasten anything anywhere.

The iron structure is more expensive than wood, but lighter, exempt from fire, and, with the provision for bolt attachment above referred to, more convenient.

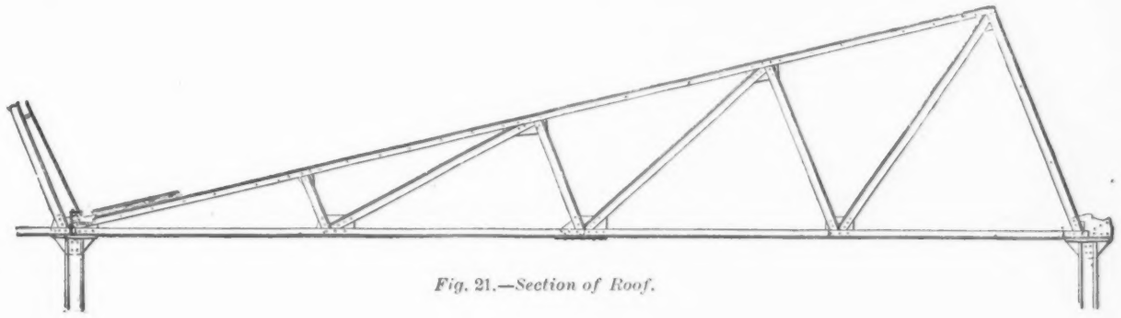

Fig. 21.—Section of Roof.

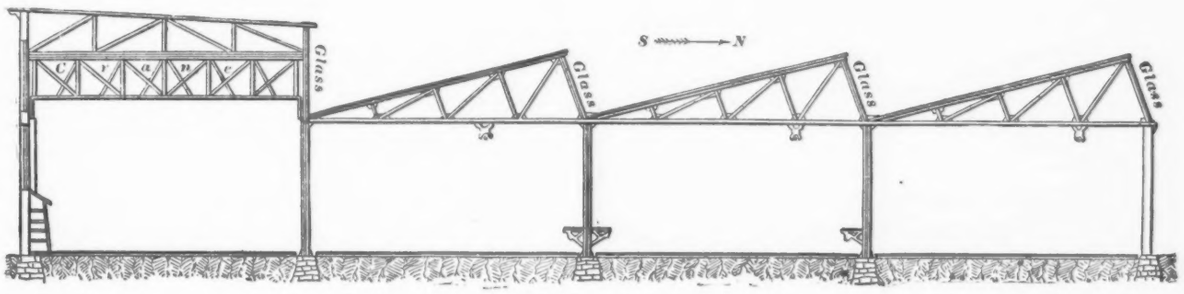

Fig. 22.—Cross Section Looking West.

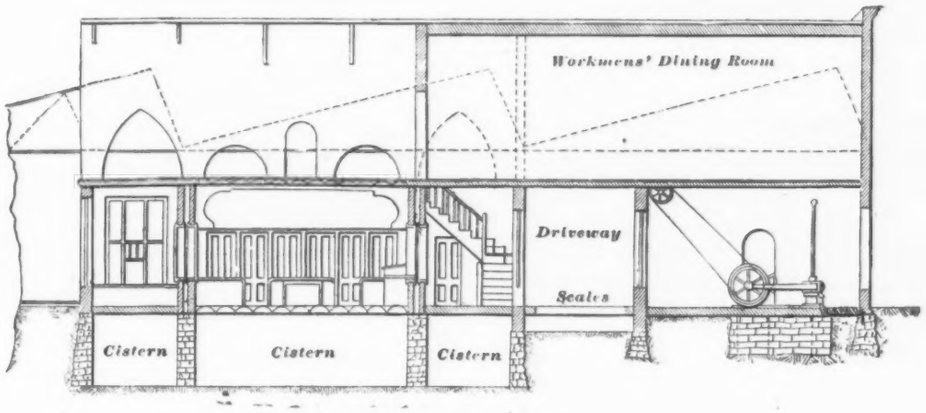

Fig. 23.—Section through Office and Engine Room.

WEAVING SHED DESIGN.

The trusses are strong enough to hold 3 or 4 tons besides the roof, so that any pieces of machinery or work which are liable to be handled can be raised by tackle attached to the trusses in whatever part of the place they may be.

The question of snow, which seems to be the bugbear to every one first thinking of the weaving-shed roof, is one requiring hardly a second thought. Making the gutter of cast iron, as shown in Figs. 19 and 20, or any convenient shape, and putting it inside the building, with the heating pipes adjacent, is all which is required. Keeping the gutters clean is all there is to it, and snow and ice will thaw sooner in cast iron than on the wood planking when the heat comes from the lower side.

Eight feet between centers would seem to be too near together for posts, but by making benches 12 feet long, supported by two posts, leaving 4 foot spaces between the ends of the benches, the apparent objection vanishes where the bays are as wide as 32 feet.

In a building for large work, with 10 feet between trusses, the bays could easily be 40 or more feet, with 8 feet of glass on the northern slope.

The geometry of the roof is very simple: simply dividing the lower chord in four equal parts, and the rafter into four equal parts, and joining the points with the struts and braces, Fig. 21. While economy of material would dictate iron of different section and weight, to save bother we used all alike, and as the accidental loads are unknown quantities placed in unknown positions, perhaps that was as well as applied high science.

The accompanying cuts are self-explanatory (Figs. 21, 22, 23).

In the weaving shed system of lighting the annual cost for repairs of broken glass is practically *nil*, and in this connection the writer volunteers to say that he believes an erroneous idea is pretty universally prevalent in regard to the most economical size for lights of glass for shop lighting. The theory is that the small size lights for various reasons are the most economical. But after a long observation the evidence to me is conclusive that the larger the lights the less the cost for repairs. Large lights stand far more punishment, and the workmen have some respect for a light of glass which costs a dollar, but none whatever for 10 x 15 glass. Whether these are the reasons or not, the fact remains that where in one part of our works the annual breakage of 10 x 15 glass does not fall below 100, there is another part where the large lights were equally exposed, and there was but a single light broken in two years.

In the works mentioned the main office is a fire proof vault in effect. Drawings, books and valuable papers are thus protected by simply closing the fire-proof doors, which are self closing, in case of fire, if neglected. For small works this is better than a separate building, as it concentrates the supervision. Low partitions, or simply a railing, separate the pattern shop from testing floor and main shop, instead of closed rooms, with a great advantage (Fig. 23).

It leaves the whole place subject to observation, and the men work nearer ten hours a day when paid for ten hours, and are just as happy at night as if two hours out of the ten had been spent in visiting.

Prof. D. S. Jacobus of Stevens Institute described the methods he had followed in the

Experimental Determination of the Heat Generated per Candle Power by Oil and Gas Lamps.

The general idea of the method employed to measure the total heat generated is as follows:

The lamp is surrounded with an air-tight wooden chamber about 4 feet square, with a circular air-inlet pipe at the bottom and another near the top. When steady action is established, the temperatures of the air entering and leaving the chamber were determined by thermometers located at a sufficient number of points, in each of the air pipes, to establish a true average for the entering and exit currents. An anemometer was uniformly moved about the cross section of the inlet pipe, and the candle power simultaneously determined by a photometer applied by the side of the chamber. The lamp is then removed from the chamber and a steam coil substituted. The condensation of steam in this coil is adjusted so that the anemometer and thermometers give practically the same readings as when the lamp was in the chamber. The total heat given by the lamp is then determined from the latent heat of the steam condensed, proper allowance for differences of radiation, effect, &c., being made.

It is evident that by this method we avoid having to interpret the readings of the anemometer as absolute velocities. The only means of doing this is to calibrate the anemometer by moving it at uniform velocity through the air, as, for instance, by attaching it to the end of a radius arm rotating at uniform speed. The condition of the anemometer when so calibrated differs so much from those surrounding it when located in the inlet pipe that in the present case the amount of air differed 20 per cent., when thus determined, from the true amount as deduced from the heat of the condensed steam, by means of the observed temperatures of the entering and exit air.

The results reached are presented in tabular form.

The tests mentioned by R. Van A. Norris of Wilkesbarre, Pa., in

Tests of a Pump Receiving Suction Water Under Pressure

were made in April, 1892, with the view of determining the advantages of the plan of feeding water under pressure to a direct-acting pump over that of drawing the water from a receiving well. The circumstances were as follows:

The borough of Nanticoke, Pa., is supplied with water from Harvey's Creek, a small stream tributary to the Susquehanna, the water being conducted through mains from a dam some 2 miles up the creek, and reaching the Nanticoke Water Company's pumping station with a piezometric head of about 60 feet when the pipe is flowing about 1,000,000 gallons per day. Up to the above date the water had been discharged at the pumping station into two receiving wells, Fig. 24, and thence pumped into the town mains by two duplex Gordon & Maxwell pumps, 22 inch steam cylinders, 12½ inch plungers, 16½ inches actual stroke. It was suggested by J. H. Bowden, the chief engineer of the company, that the pressure of water in the mains could advantageously be used in feeding the pumps. Accordingly one well was thrown out of use, and the connection shown in Fig. 24 put in, consisting merely of an 18 inch pipe connecting the suction of the pumps to the inlet from the main and extending across the No. 1 well, with a 10-foot length of 18 inch pipe standing vertically as an air chamber, to obviate any danger to the pumps from water ram. In this air chamber, and extending to the bottom of the tee to which it was connected, was a movable screen for removing any floating material from the water. This screen is readily removed from the bottom for cleaning.

Both pumps, it will be seen, were arranged to draw from either well, so that no stoppage was necessary in making the change; and when it was desired to change from suction to pressure, or *vice versa*, all that was required was the opening of one valve and the closing of another.

The pumps are supplied with steam from the Susquehanna Coal Company's boilers at their No. 2 shaft, distant about 150 feet, through a 6-inch wrought pipe, and just before the pressure was turned on they were both making 25 single strokes of each plunger per minute, sucking their water from No. 2 well. As soon as the valves were changed their speed increased to 33 strokes, without change of steam valves, and they appeared to run much more smoothly.

Four cards were taken from each end of each cylinder under each condition, and the results in the table given in the paper are averages from them. The pressure in the "suction" pipe was determined by a pressure gauge in the position shown, read at time of taking each card.

The cards taken seemed to show that about 90 per cent. of the gauge pressure in the main was utilized, and that the resulting saving in steam calculated from the cards was about 20 per cent.

DISCUSSION.

In reply to Mr. Norris' paper on "Tests of a Pump Receiving Suction Water under Pressure," Mr. Wheeler spoke in favor of the suction chamber, particularly in marine practice. He illustrated his remarks on the blackboard and pointed out the manner in which he has overcome difficulty in marine pumps and pumps operating in stationary plants. "Put a good suction chamber on your pump and you will be surprised at the good results," he said. His experience had shown that the suction chamber should not be placed on the main, as the water would rush by the opening and would not enter the chamber. It should be placed at the other side of the pump when the momentum of the water would carry it into the chamber.

A New Recording Pressure Gauge for Extremely Low Ranges of Pressure.

This device was described by its inventor, Prof. W. H. Bristol of Stevens Institute, who exhibited one of the gauges.

Since describing and exhibiting a sinuous tube recording pressure gauge at the New York meeting of the society in November, 1889, many of the instruments have been placed in successful operation; but it has been found impracticable to make gauges on the flattened sinuous tube principle which would be sufficiently sensitive to register extremely low ranges or variations of pressure. Such are the variations due to a difference of $\frac{1}{10}$ inch head of water, as in the case of illuminating gas in street mains, where the total range rarely exceeds 2 ounces per square inch, or its equivalent, 4 inches head of water. For such extremely low pressure, it was necessary to offer a very large area for it to act against. This has been accomplished by employing a series of corrugated diaphragms arranged in pairs and joined, with a continuous opening through the line of centers of the different pairs, thus permitting the pressure to exert itself simultaneously on the interior of every pair, the effect of variations being to produce an elongation of the whole.

This arrangement of the diaphragms is employed in the construction of certain self-registering barometers, the small motion of the diaphragms being made available by a train of multiplying mechanism. In the gauge now exhibited, the disadvantage of using multiplying devices is entirely obviated by simply securing a flexible strip along the edges of the diaphragm tube, as it might be called. The effect of applying the flexible strip is twofold: 1, it stiffens the diaphragm tube as a

whole; and 2, it performs the most important function of resisting the tendency of the pressure to elongate it, which naturally results in producing a greatly multiplied lateral motion.

As in the sinuous tube, the motion thus produced by variations of pressure is ample for directly indicating or recording in connection with a moving chart. By the use of a large number of diaphragms it is evident that the change of form of each individual member is very slight for complete range of pressure. It follows that none of the diaphragms will be strained to their elastic limit, and all danger of the gauge taking permanent sets will be avoided. In the application of the diaphragm tube to a recording gauge it is mounted on a back. A recording pen is attached directly to the end of the diaphragm tube, and a clock is provided, timed to revolve a dial, in the plane of movement of the pen, once in 24 hours.

This form of tube is not limited to recording gauges for light pressures only, as it could be equally well adapted for all ranges if the diaphragms are properly proportioned as to size and thickness of metal.

There are other practical applications of this form of tube, if constructed on a large scale, as considerable motion and power could be developed; sufficient, it is believed, to operate directly, without intervening mechanism, regulators, dampers, valves, and especially that class of automatic devices in which pressure is the initial motive power.

Professor Bristol pointed out, as a further application of this device, that it could be adapted to record the temperature of the gases passing up a stack from a furnace. In order to do this it would only be necessary to place a closed metallic tube of suitable size in the stack in the path of the gases, and to connect this tube to the diaphragm tube by a pipe of very small bore. The recording part of the apparatus could be placed at any convenient distance from the stack so that it would not be influenced by the heat. The air contained in the closed metallic tube would be expanded and the temperature of the heat causing this would be recorded by the gauge, a reliable thermometer being first used to obtain the necessary calibration. An arrangement of this kind was shown and when the closed tube was placed in the flame of a Bunsen lamp the recording pencil responded promptly, showing that the expansion of the air in the closed tube had affected the diaphragm tube.

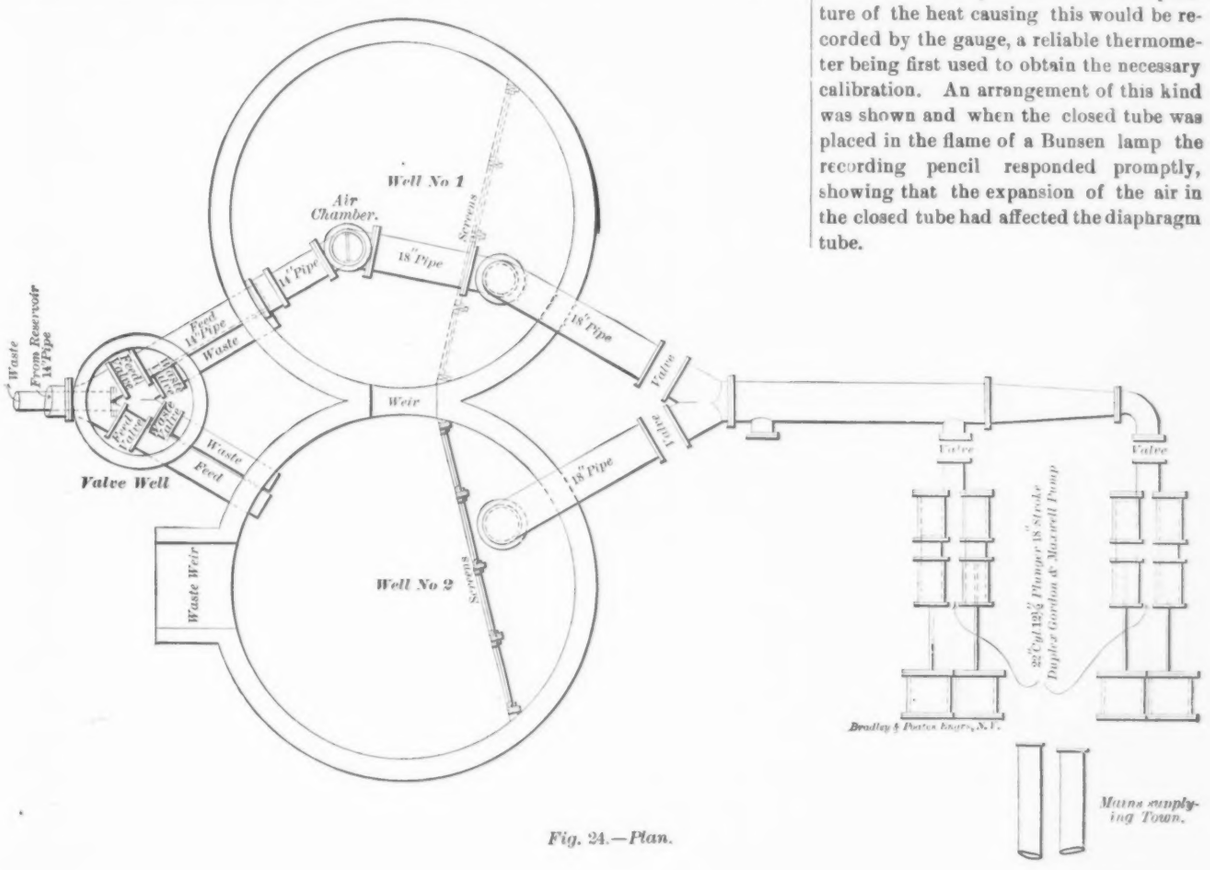

Fig. 24.—Plan.

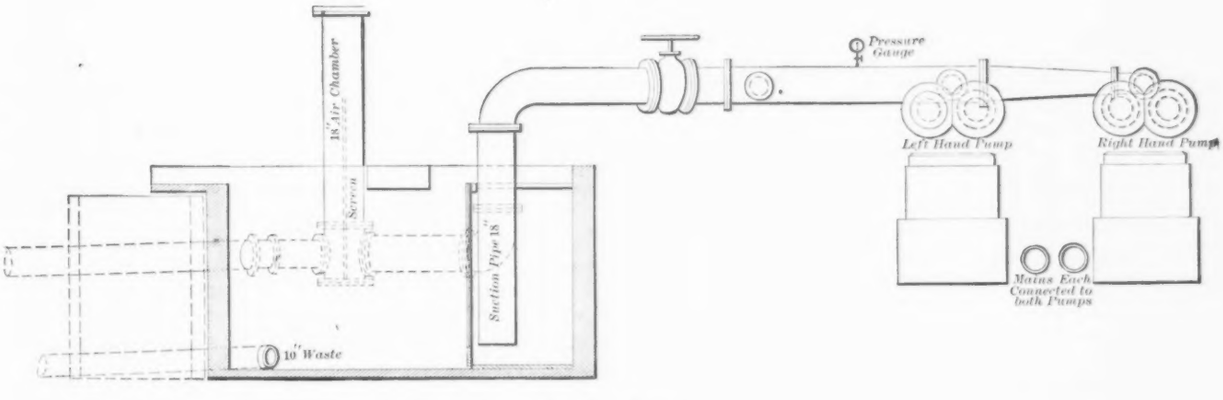

Fig. 25.—Section.

TESTS OF A PUMP RECEIVING SUCTION WATER UNDER PRESSURE.

DISCUSSION.

Mr. Norris asked Mr. Bristol if his gauge had been applied to fans in buildings and mines. Mr. Bristol replied that that was an application that had not occurred to him yet, because he had never had any connection with mining. He could see no reason why it could not be successfully used in that connection. It is only a matter of making the tube a little lighter so that the whole range could be 1¼ instead of 4 inches.

Performance of an Overhead Traveling Crane Operated by a Single Electric Motor.

This was the subject of a paper by Anthony Victorin of West Troy, N. Y., the crane described being in the army gun factory, Watervliet Arsenal.

The crane is operated by a single (flat-field) electric motor. The electric current is generated by a Thomson-Houston 65 horse-power dynamo. Its voltage is 500, the speed 1020 R. p. m. The crane has a span of 60 feet, a clear hoist of 40 feet, and a capacity of 120 gross tons. The capacity of the auxiliary hoist is 10 tons, hoist 56 feet. The total weight of the whole crane is about 150 tons. The bridge rests on 8 double-flanged wheels (4 on each side) of 36 inches diameter, the trolley on 16-inch wheels of 24 inches diameter. All wheels are ranged in pairs in compensating beams to avoid inconvenient results from want of uniformity in the level of the track rails. All wheels have also anti-friction steel roller bearings.

The motor is located at one end of the bridge. It receives the electric current through a bare copper wire which is strung on insulated rollers along the crane ways. The motor is in permanent gear with the clutch shaft. This shaft is fitted with four clutch gears.

The crane performs the following operations: Bridge travel = 40 and 80 feet per minute; trolley travel = 50 and 100 feet per minute; main hoist = 2, 4, 8 and 16 feet per minute; auxiliary hoist = 20 and 40 feet per minute; automatic brakes are provided to sustain the load in any position.

The trolley is provided with two grooved chain drums, each being capable of winding 250 feet of 1¼ inch wrought-iron main hoisting chain. These chain drums revolve loose on trolley axle shafts, 7 inches in diameter, with bronze-bushed bearings of 24 inches length at each end of drums.

The lower chain-sheave block contains six bronze-bushed sheaves of 30 inches diameter, while the upper block contains five sheaves of 33 inches diameter, each of which swivels independently of the others.

The chain is rove 12 times through the sheaves.

The chain drum of the auxiliary hoist is located above one of the main chain drums, and is grooved for a ¾-inch chain of sufficient length for 56 feet hoist.

The operating cage contains all manipulating levers, also the main switch, rheostat, &c.

All motions of the crane can be in operation simultaneously.

All gears of the crane mechanism are carefully cut, except the gears on the chain drums, which are cast; all bearings have bronze bushings. All working surfaces are finished smoothly and all parts are carefully adjusted.

But notwithstanding all possible care with respect to the construction and the arrangement of the crane mechanism, a great percentage of the driving power is absorbed by friction and the maximum efficiency of the main hoist is only about 40 per cent., the lowest efficiency is about 20 per cent.

It may reasonably be assumed that the friction in the mechanism for the bridge travel and the trolley travel attains similar proportions, as given for the hoist; and that the efficiency ranges from about 25 per cent. for the slowest speeds, with the greatest number of gear trains in operation, to about 50 per cent. for the highest speeds, with fewer parts in operation.

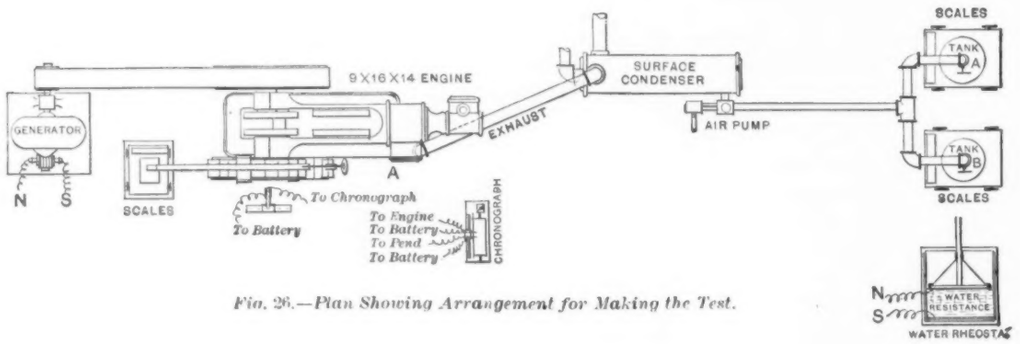

Fig. 26.—Plan Showing Arrangement for Making the Test.

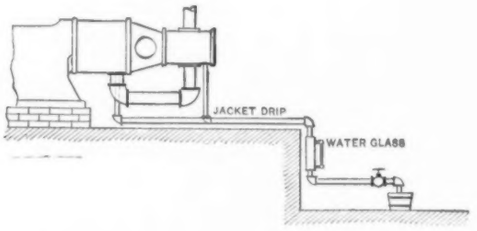

Fig. 27—Method of Obtaining the Jacket Water.

EFFECT OF STEAM JACKETS ON HIGH-SPEED ENGINES.

The figures in the table permit various calculations as to the frictional resistance in certain parts of the crane, *i. e.*:

	Ampères,
Actual work of hoisting 120 gross tons 2 feet p. m. =	50.27 H.-P. = 75
Theoretical work of hoisting 120 gross tons 2 feet p. m. =	16.3 H.-P. = 24.3
Frictional resistance in crane =	33.97 H.-P. = 50.7
Actual work of operating hoist 2 feet p. m. without load =	10.05 H.-P. = 15
Frictional resistance due to the load of 120 tons =	23.92 H.-P. = 35.7

It was observed that the power required to bring the crane mechanism up to speed from the state of rest is considerable, and is from about 30 to 150 per cent. in excess of the power required for keeping an operation in continuance.

From the table referred to we take the following:

	Ft. per m.	Efficiency. Per cent.
Trolley travel	2.5	7
Trolley travel	1.5	47
Hoist	3.5	17
Hoist	15.	94
Hoist	3.5	16
Hoist	10.	48

The paper by Prof. R. C. Carpenter of Cornell University, on

The Effect of Steam Jackets on High-Speed Engines

Also considered the comparative variation in economy with change of load in simple and compound engines. The engines tested were of the standard automatic type, with a fly-wheel governor of somewhat novel design, but yet very efficient in its action, as shown by the accompanying log of the tests. The compound engine was of the tandem type, with the high-pressure cylinder arranged in the usual manner outside the frame. The cylindrical or barrel portion of the high pressure cylinder was jacketed, and connection made to the boiler in such a manner that steam of boiler pressure could be supplied with jackets at pleasure. Tests were made with and without the jackets filled with steam. These tests are of interest as showing the effect of jacketing the cylinder barrel on high-speed engines.

The following gives the dimensions of the engines tested:

Table of Dimensions.

	Simple automatic.	Tandem compound.	
Diameter of cylinder, inches	12	9	16
Length of stroke, inches	14	14	14
Diameter of piston rod, inches	1¼	1 7/16	2½
Area piston, head end, square inches	113.1	63.62	199.43
Area piston, crank end, square inches	111.2	62	196.15
Clearance as measured, per cent.	8.75	12	9
Revolutions of engine per minute	245	265	265
Horse-power constant per pound, M. E. P. head	0.982	0.592	1.865
Horse-power constant per pound, M. E. P. crank	0.952	0.577	1.835
Ratio of volumes in compound engine	.....	1	3.12
Ratio of volumes, including clearance	.....	1	3.03

The general arrangement adopted for making the test is shown in Fig. 26. The engine to be tested was set on a heavy foundation at A, which was in close proximity to a boiler fired with natural gas. The exhaust from the engine was led to a surface condenser, on a lower level and about 20 feet distant. An air pump removed the condensed steam, and delivered it as required into either of two tanks

standing on scales. The water for condensation was supplied from the city water works.

The load during the test of the simple engine was obtained by driving a Thomson-Houston generator, arranged to deliver its current to a water rheostat designed by F. N. Bulkley.

Without going into the details of the test we may state that the compound engine was less affected by change of load than the simple. Thus, with a load 25 per cent. of that for which the engines were rated, the steam consumption with the simple engine was 143 per cent. of that at its rated capacity, the steam consumption of the compound only 124 per cent. of that at its rated capacity. In other words, the compound engine was less affected by change of load than the simple engine, under the conditions of the test. These conditions approximate very closely to those under which these classes of engines are usually worked, and indicate results directly opposed to common hypotheses respecting the performance of the two classes of engines.

The average results obtained for the compound engine with and without jackets were:

	Pounds per I. H. P. per hour.
No steam in jackets	23.81
Steam in high-pressure jacket	23.91
Steam in both jackets	23.13

The second series of tests showed that for most conditions the engine with the cylinders steam jacketed consumed less than when not jacketed; that this difference was greatest for the least loads, was probably about 2 per cent. at rated capacity, and the conditions were reversed for heavy loads, the unjacketed cylinder becoming the more economical.

Considering these results only for loads between 60 and 120 H. P., we have, as the average:

	Pounds of dry steam per I. H. P. per hour.
With steam in jackets	19.10
With no steam in jackets	20.1

These tests show in all cases a slight gain due to the use of the steam jackets, the amounts varying in the different tests to from 2.75 per cent. to 5 per cent. of the steam consumed. The use of the high-pressure jacket alone seems to have produced no especial effect, the results being better without it.

Tables accompanying the paper give the results in detail.

DISCUSSION.

Professor Thurston said in part: "Professor Carpenter has given us an interesting series of results of tests of a new, and in some respects novel and very interesting, form of high-speed engine. Its indicator diagram is an exceptionally good one for that type of valve gear and method of steam distribution, and the economical performance of the machine may be rated, I think, as high for a single valve. In the comparison the higher speed of the compound gives it a slight advantage, but I presume not to exceed 1 or at most 2 per cent. The rating of the simple engine is remarkably close to its best performance, a little above, rather than below, 0.7 horse-power per square inch of piston area. The curve shows its best rating economically to be close to 70 horse-power, or a trifle over 0.6 horse-power per square inch under the conditions of the test. The variation of steam consumption seems unusually symmetrical on either side of the minimum within a wide range. An interesting fact is the close coincidence of the cut-off of minimum steam consumption and that observed by Engineer-in-Chief Isherwood in the naval engines reported upon by him in his "Resources in Steam Engineering," thirty years ago. He found 0.4 to be the best in this respect for the comparatively large unjacketed simple engines of his time, the real cut-off being considered.

The compound engine, like the simple, has a rating somewhat above its most economical power, but I should think wisely. In a large proportion of cases the engine is called upon to work at a power less than its rated capacity rather than above. Here the rating is 0.5, the piston area; the highest economy of steam is found at 0.45, as tested. The loss of efficiency is substantially uniform on either side the minimum for a considerable range of power.

The gain of one-third as compared with the simple engine I should attribute mainly to the condenser, in a less degree to the increased pressure and higher expansion, and in a minor extent to the somewhat higher speed of rotation. The latter tests show the condenser to have saved about 4 pounds out of the 10 or 11, which is less than would probably be expected where a condenser is attached to a simple engine. Condensation and higher speed together raise the maximum expansion in a single cylinder from 2.5 in the simple to above 3 in the compound. The designer has struck precisely the right proportions apparently. The steam consumption at highest economy is that which seems to be about the usual and best figure for compound engines of the better class under similar circumstances. Between 18 and 19 pounds of steam per hour and per horse-power is coming to be a very familiar figure with the machines of this class by the best makers, worked condensing; as 22 or 23 may be taken as representative of best work for a non-condensing engine.

The experiments with the jackets are exceptionally interesting, though the fact that the jackets were applied only to the barrel, where it is well understood that they can have comparatively little effect in any case and not to the heads, where they would have maximum value, reduces their influence to a minimum. As is usual in such engines, we find the jacket useless on the high-pressure cylinder. The temperature heat is insufficient to drive heat through the cylinder in quantities to check internal wastes and the most wasteful surfaces, those of heads and port spaces, have no jackets to give even slight benefit. On the low-pressure cylinder, with a difference of temperature of about 80° F., due to a difference of about 80 pounds pressure inside and outside the cylinder at cut-off, the jacket gets useful work in to an observable, but not large, amount. With jacketed heads this gain would presumably have been doubled; but no great gain is expected ordinarily from the use of the jacket on this class of engine. Whether it will pay to jacket or not even here, however, depends obviously on the market price of fuel. Taking as here the gain to be about 1 pound of steam per horse-power per hour, and coal capable of evaporating 8 pounds of water into steam per pound of fuel as worth $3 per ton, an engine of 100 horse-power would save in a year's work of 3200 hours about 20 tons of coal, or $60, the interest on $1000; or assuming the extra cost of the jacket on the low pressure cylinder to be as much as $50, over 100 per cent. per annum. I suppose, however, that in this case the cost of the jacket may fairly be taken as simply that of the extra weight of cast iron used, or perhaps not over 300 pounds at a cost of less than $10, on which the interest would be 600 per cent.—a very fair return. I do not imagine the risks on this small engine arising from the addition of the jacket need amount to anything worth considering. It requires a singularly small saving as measured in percentage of steam and of fuel to make the introduction of the minor improvements of the steam engine profitable. Were this engine driving a flour mill or other establishment running night and day, this jacket would pay about 1200 per cent. on the above basis and the proprietor would find the borrowing of money at even old-fashioned rates in the West enormously profitable. It is these considerations, I take it, which determine whether it pays to jacket an engine—even a high speed engine—or not.

The writer of the paper refers to my remark relative to the importance of draining the jackets back to the boiler and not into the hot well or elsewhere. Where, as is often the case, the jacket water amounts to 20 per cent. with actively and effectually working jackets, the difference of something like 200 thermal units per pound sometimes, this produces amounts from 2 to 4 per cent. of all the heat expended in the operation of the engine and of the fuel ample to develop the heat. That is to say, the cost of piping and traps to the boiler from the jackets would be slightly more than the drainage apparatus to the hot well and would save good interest on the cost of the engine, often to thousands of per cent. on their own excess of cost. In cases like that here presented the saving would be comparatively small, but even here it would pay well to conduct the jacket water to the boiler. Assume 3 per cent. to be the average saving here obtainable in ordinary working, then this difference would be something less than 1 per cent. of the heat and the interest on about $150 or $300, instead, as in the case just assumed, of $1000 to $2000, accordingly as the engine runs by day only or night and day.

A Variable Speed Power Transmission.

The invention of E. F. Gordon, mechanical engineer of the John A. White Company of Dover, N. H., was described by H. C. Spaulding of Exeter, N. H.

Simply stated, the device consists of a deeply-grooved pulley, split by a plane perpendicular to its axis, and dividing it symmetrically, with means for varying the distance of the two parts one from the other.

Given a belt adapted for the purpose, it will, in running on such a pulley, lie nearer the center as the two parts are more widely separated, and recede as they are

brought nearer together. Such a pulley may be used on either the driving or driven shaft, or both, and it is evident that the shafts may be at any practical distance apart, also that the greater the pull on the belt the greater its hug and consequent freedom from slip. In some cases it is desirable to place a loose pulley between the two parts referred to, making a compact arrangement for starting, stopping and varying speed, in the space ordinarily occupied by a single pulley of the usual style.

Fig. 28 shows such an adaptation of the device, with one of the many available arrangements for varying the working radius of the pulley. In the illustration, A is the shaft, B C the two halves of the pulley, D, the idler, E the belt, F G hand wheels, H a collar fast on the shaft. By the action of the belt, B and C tend to separate from each other, and since B is fast on the shaft A, C, which is splined on the shaft, and hence must turn with it, although free to move along it, is forced against F. The hand wheels F and G are free to turn on the shaft, but may be held at rest whenever desired. The hub of one carries a male screw, and the other a female, so that by altering the position of one on the other they increase or decrease the distance between the collar H and the half of the pulley C, thereby allowing C to recede to a greater or less distance from B, and determining the position of the belt E, and its consequent speed relative to that of the shaft A. It will be evident that in this construction, when used as a driving shaft, the belt speed will become less and less as F is screwed into C, until C has so far receded from B as to allow the belt to drop on to the idler P, when the driven mechanism will come to a standstill, to be gradually started again by the adjustment of F and G.

Fig. 29 shows a still simpler form, applicable when the pulley is located on the end of a shaft. In this case the loose pulley is omitted, it being assumed that only a speed adjustment is necessary, one part of the pulley being fast on the shaft, the other free, but loosely pinned to the first so as to rotate with it, the working radius being determined by the adjustment of a hand screw.

The belt may be either round or nearly square in section, though for the most of the experiments so far made a narrow double-ply leather belt has been used, with the edge beveled to correspond with the angle of the pulley's face.

The construction shown in Fig. 29 has recently been applied to the feeding rolls of a 48-inch band resawing machine in a way which illustrates its simplicity and adaptation to this class of work.

In answer to a question Mr. Spaulding said that there was no tendency of the belt to bind in the groove and that the two parts of the pulley could be brought toward each other or separated by the thumb and finger while the parts were in motion.

Tests on the Triple Engine at the Massachusetts Institute of Technology.

These tests were described by Prof. C. H. Peabody and E. F. Miller. The engine has provision for jacketing the barrels and heads of the cylinders and the intermediate receivers. The tests given here are the beginning of a series which are intended to show what advantage, if any, may be obtained by jacketing the various organs of the engine with steam. While the engine is provided with the necessary piping, valves, &c., for running in various combinations, and while the cranks may be set at various angles, it was run in the usual way for a triple engine with the steam passing in succession through the high-pressure cylinder, the first receiver, the intermediate cylinder the second receiver and the low pressure cylinder, and then to a surface condenser; and the cranks followed at 120° in the order of high, intermediate and low pressure. The priming in the steam near the throttle valve was 1.1 per cent. for all the tests. The steam in the jackets was at boiler pressure and was assumed to have the same quality. The steam condensed in the condenser was collected and weighed in tanks; the drain from the several jackets was caught and measured in graduated receivers. All the tests were one hour in duration.

Some of the principal dimensions of the engine are given in the following table:

HIGH.

Diameter	8.99 in.
Stroke	30.00 in.
Diameter piston rod	2.19 in.
Clearance in per cent. of piston displacement	C. E. 9.76 H. E. 8.83
Piston displacement,	C. E. 1.037 cu. ft. H. E. 1.102 cu. ft.

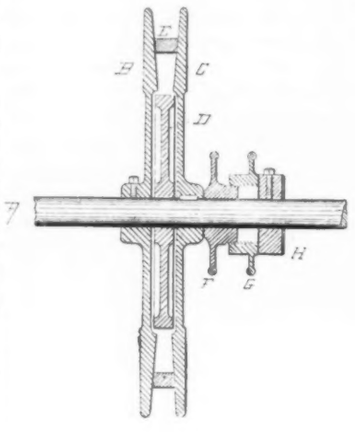

Fig. 28.—Method of Varying the Working Radius.

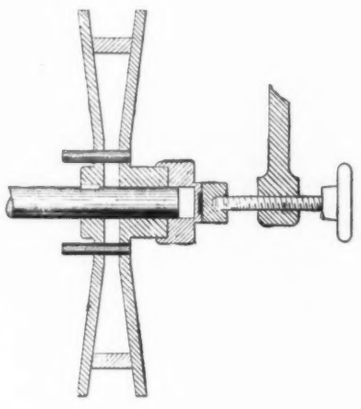

Fig. 29.—A Simpler Form.

INTERMEDIATE.

Diameter	16.01 in.
Diameter rod	2.19 in.
Stroke	30 in.
Clearance in per cent. of piston displacement	C. E. 10.9 H. E. 10.4
Piston displacement,	C. E. 3.430 cu. ft. H. E. 3.495 cu. ft.

LOW.

Diameter	24.063 in.
Diameter rod	2.16 in.
Stroke	30 in.
Clearance in per cent. of piston displacement	C. E. 12.27 H. E. 12.18
Piston displacement,	C. E. 7.831 cu. ft. H. E. 7.894 cu. ft.

The results obtained are given very completely in tables. In their closing paragraph the authors say:

Though it is too early to announce any definite general conclusion from this series of tests, we have gathered a general idea that it makes but little difference where steam jackets are used on an engine, provided the jacketing is carried far enough and not too far.

DISCUSSION.

In a written discussion, A. F. Hall said, in part:

As an instance of the inaccuracy with which the economy of the performance of various engines is rated, that based upon the weight of steam per indicated horse-power per hour may be cited. It is customary for many experimenters to deduct the weight of steam entrained, or condensed in the steam pipes, and which has passed through the engine, from the weight of water pumped to the boiler, and from this result deduce the steam consumption of the engine. That such a method is entirely wrong those acquainted with the fundamental principles of thermodynamics can readily understand. All the water entrained or condensed which enters the cylinder carries with it heat, which performs work in that cylinder, and the deduction of such water gives the engine the credit of doing work with less heat than it actually utilized. The object of all calorimetric measurements should be to determine the quality of the steam supplied to the engine in order to calculate correctly the amount of heat utilized by the engine. Any assumption as to what the engine would have done with the same boiler pressure and when supplied with perfectly dry steam is all wrong, because the physical conditions of wet and dry steam are not the same. It is hoped that some day the engineers will all see the fallacy of rating the performance of engines upon the weight of steam consumed per indicated horse-power per hour except for merely rough approximations for studying the true merits of the economy of the engine, when considering cylinder condensation ratios of expansion and use of jackets, it is of little value. The steam engine is a heat engine and should be so treated in all accurate investigations.

Other speakers objected that the time (one hour) of the tests was too short. Professor Peabody maintained that with proper appliances and with the tests in charge of experienced observers, this time was ample.

Other papers presented at the meeting were "A New Graduating Steam Radiator," by John T. Hawkins of Taunton, Mass., "Negative Specific Heat" and "Hydraulic Reaction Motors," by Prof. DeVolson Wood of Stevens Institute, and "Notes on the Refrigeration Process and

VARIABLE SPEED POWER TRANSMISSION.

its Proper Place in Thermodynamics," by George Richmond, New York.

The last paper was by W. S. Rogers of Troy, N. Y., on

To What Extent Can the Milling Machine Replace the Planer in Daily Operation?

In the present day, when old machinery has served its allotted time of usefulness in the shop and must be replaced by tools replete with modern ideas, it is a matter of no small moment to every practical, progressive shop director having the responsibility of the semi-annual dividends thrust upon his shoulders, to determine just what type of machines to select which will be best adapted to his special line of work.

For example, if the work has always been done on planers, and they are peculiarly adapted to it, would it be advisable to replace the old ones with new ones with latest improvements and added strength? If so, what will be the percentage of gain in time over those now in use? Or shall a milling machine be the tool to be placed on trial to shorten the present hours of work performance? And also, what type? not whose make. In all the written data relating to milling machines and their many good qualities, the writer has been unable to discover anything which would enlighten him in such manner that he could know intelligently and to a certainty which type of machine would be the most desirable for the class of work to be operated upon. It has been found during investigation preparatory to purchase, in answer to the all-important question, How much work will the milling machine perform in a given length of time, and how will that amount compare with the work produced from the planer in the same time? that the builders of machine tools give nothing definite whereby we can base our calculations. They confine themselves generally to the superiority of their manufacture over competitors, which we always concede.

In the example which I shall quote, one manufacturer of both planers and milling machines, who knew from personal observation just what the class of work was, expressed himself favorable to the planer as being the machine best adapted for it. But a decision being made in favor of the milling machine, and the type known as a "slabber" being chosen, it was bought and placed in position in the works, especial attention being given to its foundation, and warning being given to its maker that it would be subjected to the severest duties in its battle for supremacy over its rival, the planer, and the true merits of the milling machine demonstrated in comparison, if possible. I would like to add, in parentheses, I have always thought the builders of this especial machine were a little bit more slack about it than they would have been if they had not received our "warnings."

The planer used in this test is of modern build (being about three years old), carries two heads, and is 30 x 30 inches x 8 feet, having a table travel of 27 feet per minute. The tools used are Mushet's steel, 1½ inches square. Both machines are fully equipped with chucks and clamping devices for suitably holding the work, and in charge of first-class mechanics of long experience, and between whom considerable rivalry existed. The favorable results from the milling machine in comparison to the planer are somewhat surprising, even to those who know it best.

Eight pieces of cast-iron, 17 inches long, having a surface 8 inches wide and 1½ inches down each side, to be rough finished, are done on the planer in 4½ hours, the pieces being placed on the platen in two rows, and both heads being used simultaneously. The time required by the milling machine was just 41 minutes, straddle-mill cutters being used and one casting being operated upon at a time, the amount of metal removed being about $\frac{1}{16}$ inch in both cases.

Another class of work was cast-iron strips 16 inches long, ½ inch thick, and 1½ inches wide, to be rough finished all over. The best time made on the planers was found to be at the rate of 4 every 36 minutes, while the milling machine turned off 6 every 6 minutes. The planers in this case were small modern machines, carrying single heads and having a cutting speed of 22 feet per minute. The spindle of the milling machine makes 34 revolutions per minute, while the platen travels 13 inches in the same interval. The platen travel per minute has been doubled after coming to the works without affecting the cutter rotation. Another item of importance brought out was the fact that the cutters were colder and held their cutting qualities longer when the speed of the platen was increased and the work forced harder against them, thus conclusively demonstrating, to the writer at least, that it is frictional contact which tends to dull the cutters and wear them away by grinding, and not the actual work performed. Memoranda kept during the past year also indicate the cost for renewals for cutters and grinding to be about 25 per cent. less than the running expenses for planer tools.

Another important practical result brought about by the milling machine after it was in full service was the total abandonment of three planers and one shaper, previously used on this work, all of which now goes to the miller, and an increase in the capacity of production of over 25 per cent., thus at the same time bringing about a greater uniformity of work than could possibly have existed under other conditions. and, lastly, causing a reduction in the pay-roll, not from a reduction of wages, but because fewer men were required.

To the writer, these figures from the milling machine are not conclusive nor satisfactory, I think the platen travel of this type of machine can be increased to 20 inches per minute under the same conditions for "roughing off" work and leaving enough for finishing. I speak now only of cast iron; steel and other metals would be slower in proportion. There are to-day a thousand and one varieties of heavy work being done slowly on planers which should be done rapidly on milling machines, but the milling machine must be designed and patterned closely upon the lines of the modern planer, and must universally reach over and around the work on the platen, and be as easy to handle and operate as the present planer is to-day.

Another thought brought out from close association with a miller is the inconvenience at present existing for clamping and chucking the work. If it requires 20 minutes to clamp a piece on the planer and 1 hour to plane it, and only requires 20 minutes milling, but 1 hour is used up in clamping it securely on the miller, the latter becomes an expensive tool, and all the argument is in favor of the planer.

I have said nothing about the overhung-arm type of milling machine in this paper, as it covers a field of its own in competition with small planers, shapers and slotters, doing nice work and reasonably rapid, but as yet not up to what its possibilities are, the reasons being chiefly that it is lacking in rigidity and strength in its component parts

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The argument in the case of the Johnson Railway Signal Company of New Jersey against the Union Switch & Signal Company of Pittsburgh was continued last week in the United States Circuit Court in that city. The Johnson Company brought suit against the defendant company in 1890 for infringement of a patent apparatus invented by Robert L. Sykes, of England, who assigned the title of the invention to an Englishman named Frederick Cheeswright. The latter applied for and obtained a patent in the United States. Cheeswright gave to D. M. Yeomans a power of attorney to introduce the invention in this country, and Yeomans gave to the Union Switch & Signal Company the sole right to manufacture and sell the apparatus in the United States at a royalty to Cheeswright of £4 per lever. About 1888 Cheesman revoked the Yeomans power of attorney and gave the Johnson Company the sole right to use the invention.

The Carnegie Natural Gas Contract.

Announcement was made in Pittsburgh last week that the suit of the Philadelphia Natural Gas Company against the Carnegie Steel Company, Limited, of that city, amounting originally to $767,578, but since increased to $800,000 by additional claims for unpaid gas bills, had been settled to the satisfaction of both parties. It will be remembered that about a year ago the first named company entered suit for $767,578, claimed to be due for natural gas furnished to the defendants. The Carnegie concern refused to pay the bill on the grounds that they held a perpetual contract with the Philadelphia Natural Gas Company to furnish them gas for their numerous mills at a fixed rate. The Gas Company, upon finding that the consumption of gas for domestic purposes was rapidly increasing, decided that it would be more profitable to look after private consumers from whom they obtained better prices for gas than was secured for rolling mill owners, and notified the defendants that they would cease furnishing them gas at a certain period. Upon receiving this notice the officials of the Carnegie Steel Company, Limited, entered a counter suit, asking an injunction to restrain the plaintiffs from cutting off their supply of gas, which was granted. While the exact terms at which settlement of the suit were made could not be obtained, it is stated that the suits were withdrawn on condition that the Carnegie Steel Company, Limited, shall pay to the Philadelphia Natural Gas Company all bills for gas furnished since January 1, 1892, and that the Philadelphia Company shall pay to the Carnegie Concern an amount between $75,000 and $100,000 as a consideration for the annulment of the contract. This latter sum, it is claimed, will more than offset the sum to be paid by the Carnegie Steel Company, Limited, for gas consumed by them thus far this year. In addition the Carnegie Steel Company, Limited, will have to pay for the gas used during this year at the same rates charged other manufacturing plants, the annulment of the old contract to date from January 1, 1892. In the last quarterly statement issued by the Philadelphia Company, the amonnt of the claim against the Carnegie Steel Company, Limited, was fixed at $827,408.40. The wiping out of this amount means a nominal depreciation in the value of the 150,000 shares of stock of the gas company of about $5.50 each. It is now announced that the Carnegie Steel Company, Limited, will entirely discard the use of natural gas at their Upper and Lower Union Mills in Pittsburgh, as soon as necessary changes can be made, and coal will be used exclusively. It is claimed that preparations were made some time ago looking to the displacement of natural gas as fuel, and that the return to coal can be made in 48 hours' time without causing cessation of operations.

Hollow Shafting in Modern Steamships.

Marine machinery of to-day presents characteristic features, apart from its apparent complexity, in which it differs radically from the designs of 25 or 30 years ago, and by which the higher speeds of "Ocean Greyhounds" are maintained with an approach to economy, both in cost of operation and in space occupied.

Pre-eminent in these characteristics stands that of reduced weight per horsepower obtained; and upon this line mechanical engineers have bent their energies, until it is conceded that, with the materials now used, and with steam as a motive power, the limit of safety has been reached, and in some cases already overrun. This limit is from 8 to 10 horsepower for each ton of machinery, including boilers and all appurtenances; or rather, it is the allotment in the design, of a ton weight of machinery to each 8 or 10 horsepower demanded. While the latter figure is not at all uncommon in recent designs, it is considered too close to the danger line by many conservative engineers, especially when the element of endurance is given its full importance, so that we have such ships as the "City of Paris" weighted to nearer the former, safer limit, while practically the power she does regularly develop brings even less power per ton than eight.

Hence we must look for some very novel methods of applying motive power, or the adoption of some very different classes of materials, before we may expect any serious departure from these proportions; and yet were we to build to-day a 20,000 horse-power "machine" for a ship like the "Paris," but on the old ideas, we should find that she would very promptly sink under the load.

This greater proportional power referred to has been secured by using higher pressures of steam and by running the engines at far higher speed than was common in days gone by, and this latter factor has become possible through great care in proportioning the journals, as well as by exercising the greatest skill in their finish and alignment.

We have now shafts of 16 or 18 inches in diameter, with crank pins even larger, and with ample length to these journals our massive engines are run at the rate of 100 to 150 turns a minute (three times the old speed) without any of the bearings becoming overheated or the use of streams of water playing on them, to their injury and to the intense discomfort of the attendants.

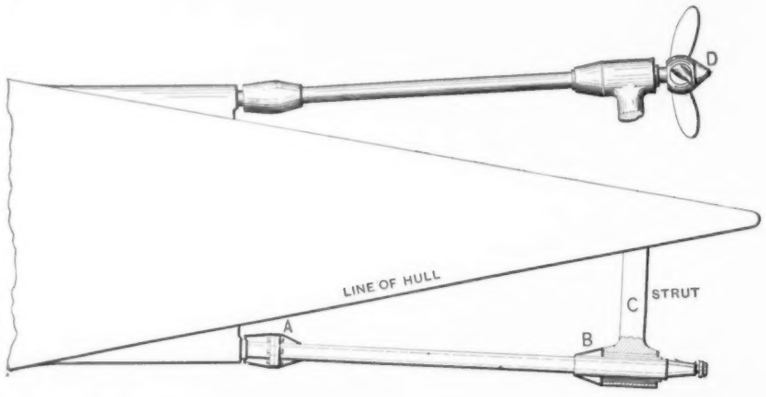
The large diameter of shafts to give them the desired bearing surfaces would carry with it very greatly excessive weight were it not for the fact that it is not necessary to have them solid. When we allow sufficient metal in the cross section of our shafts to resist the torsional or twisting stress we find that the shaft is overstrong for all other strains which it will be called upon to bear, and as a given quantity of metal is far more efficient to resist this torsion if distributed in an annular form than it would be in a solid cylinder we can have a hollow shaft of a desirable outer diameter which will really be stronger and lighter than a solid one properly calculated for.

From these considerations, as well as from a knowledge of the fact that the center or core of a solid shaft ofttimes embodies impurities, and incipient cracks which may radiate to the surface after long use, and cause disaster, we have come to adopt a method of forging our shafting solid, to a size desired, and then boring out a central hole (sometimes as much as six or eight inches in diameter) as will leave us a safe amount of metal in annular form, for the work required.

The drawing here given shows the general arrangement of modern twin screw propeller shafts. The dotted lines indicate the internal bore. The shafts are brass cased only where they pass through bearings, and in the ends of each section wooden plugs are tightly fitted to prevent the possible ingress of water.

One of the shafts (the starboard one) is shown simply in plan, with the screw propeller in position, while the other one is shown without the screw, and with the casings and strut bearing in section.

The outboard coupling A is covered by a brass or iron casing, so shaped as to present as little resistance as possible to the water, and is called a "fair water" case. This case is completely filled up with melted pitch, a substance readily removed when necessary, and affording most excellent protection to the bolts and nuts of the coupling. A somewhat similar casing is fitted on the forward end of the strut B, but is not filled, and the water has free access here to the lignum vitæ strips in the strut bearing for lubrication and to prevent wear. The strut itself C is so shaped as to pass as freely through the water as possible, while attached to the after end of the hub of the screw propellers are conical casings to protect the shaft nut and the end of the shaft itself.



HOLLOW SHAFTING IN MODERN STEAMSHIPS.

This idea of hollow shaft is carried through the entire system, even the crank pins having the same bore. Here it is ofttimes utilized for a part of the oiling arrangement of these pins, small holes being drilled from the bore to the surface of the journal, and by a system of piping the bore kept full of oil.

The Sale of the Calumet Iron & Steel Works.

An important deal was consummated in Chicago last week. The Calumet Iron & Steel Works were sold to a syndicate of Cleveland capitalists who had been conducting negotiations with the owners for a long time. A. M. Wilcox, of the well-known firm of Cleveland, Brown & Co., is at the head of the syndicate and will be president of the new organization which will operate the works. Charles Stewart will be vice-president. Other officers will be P. M. Hitchcock, Richard Brown and C. S. Wilcox. The syndicate is formed practically of the capitalists who at one time leased the Vulcan Steel Works at St. Louis and operated them so successfully. The purchase price of the property just acquired is said to be about $500,000, which is very much below the cost of the plant and improvements to the former owners, who are estimated to have invested at one time and another upward of $2,000,000.

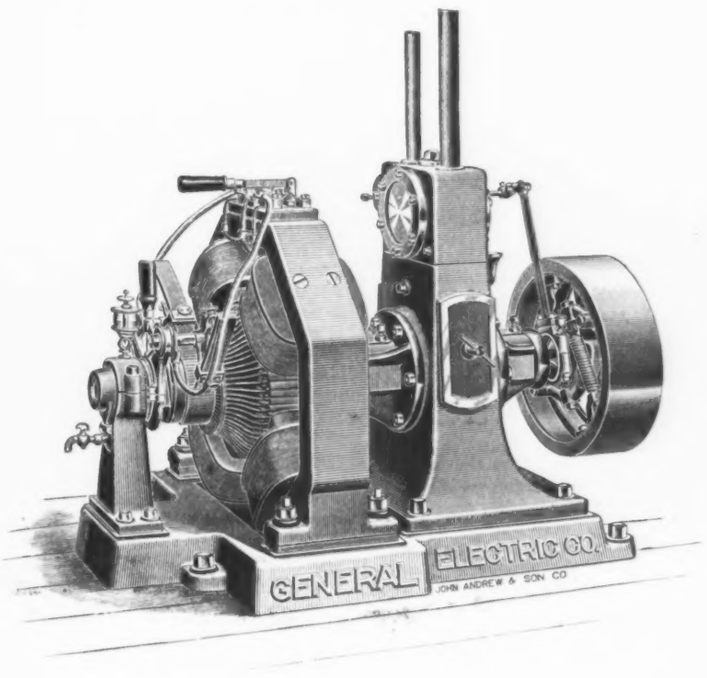
The works were first started in operation in August, 1876. Joseph H. Brown of Youngstown, formerly a partner in the firm of Cleveland, Brown & Co., sold his Ohio interests and formed the Joseph H. Brown Iron & Steel Company, to build works at a point on the Calumet River, a navigable tributary to Lake Michigan, about 16 miles from the business center of Chicago, near which a manufacturing town sprung up, now known as Cummings. Associated with him were Samuel Hale, John V. Ayer, George W. Hale, Herbert C. Ayer and others. The property purchased consisted of 65 acres. Docks were built for unloading ore from lake vessels, and a blast furnace and merchant bar mills were erected. Subsequently a nail factory and an open-hearth steel plant were built. In 1882 the works passed into other hands and the Calumet Iron & Steel Company were organized. Since that time the plant has been operated with varying success. The blast furnace was leased for a period to the Chicago Furnace Company, of which Charles Himrod was manager, and the lessees realized a handsome profit on their pig iron product. The rolling mill and rail factory were operated by the Calumet Iron & Steel Company with unsatisfactory results to the stockholders. The cut nail department was first shut down when nails declined to a very low price some three years since, and in the fall of 1891 the rolling mill was also laid off to await an improvement in trade. In February, last, the furnace was blown out, and from that time the entire plant has been idle.

The furnace is a modernized stock and has made a very good record. It is 80 by 17½ feet, equipped with four fire-brick stoves and two blowing engines. The rolling mill has 38 puddling furnaces, 6 scrap and 6 heating furnaces and one 9, one 14 and one 22-inch train of rolls. The steel department contains four 4-ton open-hearth furnaces, but they have long been in disuse, owing to their small size and antiquated construction. The nail factory has 132 machines, which are not likely to be used. The rolling mill yard contains five miles of track, supplied with ample rolling stock. Four vessels can be loaded or unloaded at one time at the docks.

The business history and practical manufacturing experience of the new owners of the Calumet Iron & Steel Company inspire confidence in their ability to manage profitably the plant which they have just acquired. It is in a good location, in fair order, and, in the hands of men who thoroughly understand the details of the bar-iron trade, it should at least be able to compete with other mills. It is the intention of the new owners to begin operations about January 1, making no additions or improvements until they are warranted by the condition of trade.

Direct Coupled Generator and Engine.

The Direct Coupled Generator and Engine, in one compact set, is, under conditions of restricted space and position, the ideal electrical plant. We illustrate a small, direct-coupled generating set, manufactured by the General Electric Company, which represents the result of two years of practical experience. For marine installations, where a separate engine is indispensable to drive the generator, these sets are especially adapted. As cheap as, if not even less expensive than, belted plants, they can be readily fitted to positions where a belt-driven dynamo and engine could not find a sufficiency of space. Their suitability for small isolated plants in hotels and buildings where belting is objectionable, is obvious. The generator is of the familiar General Electric Company quadripolar type, compound wound, having a regulation automatic, within 2 per cent. over the entire range from no load to full load. The commutators are cross connected, so that only two brushes, 90° apart, are used. The rheostat is of the new, iron frame, incombustible type. The engine and dynamo are both provided with self-oiling bearings. The sets are manufactured in 4, 8, 15, 30 and 50 kilowatt capacities.

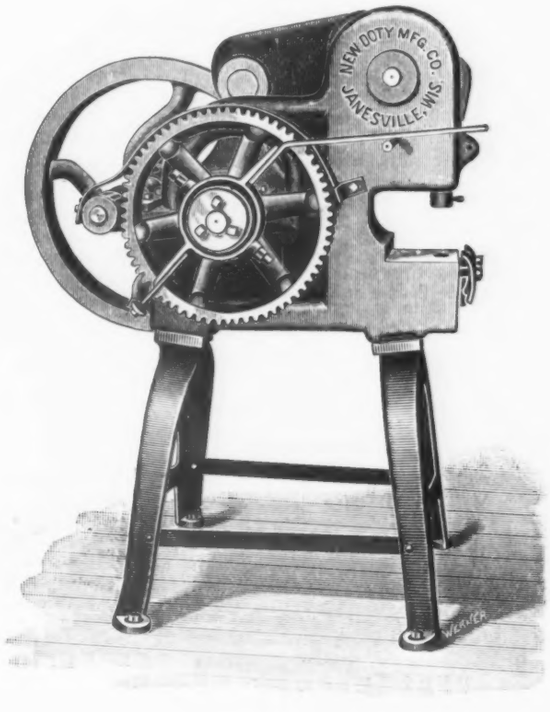


DIRECT COUPLED GENERATOR AND ENGINE.

The Board of United States General Appraisers have finished their work for the year ending October 31 The whole number of protests from all the collection districts upon which decisions have been rendered by the board is nearly 60,000, against 6000 the preceding year. The report states that there has been no occasion for compelling the attendance of witnesses under the penal provisions of Section 17 of the Customs Administrative act. A simple invitation has been sufficient to bring before the board experts who were needed, either from the mercantile and manufacturing interests or from scientific and professional life. It is remarked that the usual difficulties in ascertaining foreign market value have been encountered, but accumulated and accumulating evidence from various sources is enabling the general appraisers to reach more satisfactory conclusions in ascertaining market value of imported merchandise. It is now practicable for American merchants to buy in the open market at the places of production many varieties of foreign goods that were formerly under the exclusive control of sole agencies in this country. Leading merchants of some of the great Western cities have given assurance that, owing to the fact that the work of the general appraisers has made dishonest competition difficult, they are largely increasing their direct importations.

The New Doty Punching Machine.

The New Doty Mfg. Company of Janesville, Wis., have recently brought out the machine illustrated, which is designed for punching only. It will punch a $\frac{1}{2}$-inch hole in $\frac{5}{8}$-inch iron or do any equivalent work. The body or main part of the machine is cast in one solid piece. All the boxes for eccentric shaft and balance wheel shaft are cast solidly on the body of the machine, which makes it stiff and rigid throughout. The eccentric, eccentric shaft and clutch are all cast in one piece. The balance wheel shaft is of steel. The clutch acts promptly and noiselessly, and by it the punch can be started and stopped at any point of the stroke. The machines are fitted with an improved stripper, which is adjustable to $\frac{1}{1000}$ inch. They also have all necessary gauges and gauge rods. They are provided with tight and loose pulleys.



THE NEW DOTY PUNCHING MACHINE.

The Chicago Copper Refining Company, whose works are at Blue Island, Ill., and main office is in the Phenix Building, Chicago, have had a very successful business this year. Up to December 1 they turned out 2,800,000 pounds of ingot casting copper, and 3,600,000 pounds of electrolytic cakes and wire bars, or in all 3200 net tons as against about, 2000 tons for the whole of last year. They also produced this year 400,000 ounces of silver and 2000 ounces of gold.

Among foreign steamship agents at this port the opinion is expressed that it would be impossible to legislate immigrants away from America so long as Canadian ports were left open. Rigid restriction, it is argued, would transfer the landing places from ports of this country to those of Canada.

WORLD'S FAIR NOTES.

Largest Monolith in the World.

A striking feature of Wisconsin's contributions to the fair, to which allusion has been previously made, will be the great brownstone monolith. This obelisk, which claims the title of being the largest on earth, can trace its conception to a jocular remark made by Frederick Prentice, owner of the large quarries near Ashland, to ex-Gov. Fifield. While conversing on matters relative to monster pillars of stone in the shape of obelisks, Mr. Prentice remarked that he could surpass the largest Egyptian production from among his quarries on the Bayfield shore of Chequamegon Bay, or on one of the numerous Apostle Islands. To Mr. Fifield it hardly seemed feasible, but the earnestness of Mr. Prentice and his declaration that if the State of Wisconsin would accept and erect the monolith he would deliver it to the State without cost, for a State exhibit at the World's Fair, so impressed Mr. Fifield that he opened communication with the Board of World's Fair Managers. This correspondence, although appearing to the commission to suggest an impossibility, led them to make a visit to Ashland, and, in company with Mr. Prentice, to view the quarries. After looking over the ground they practically accepted Mr. Prentice's generous tender and agreed to take the stone as soon as it was broken from its bed and move and erect the same on the grounds to be designated by the fair officials at Chicago. Accordingly, work was commenced at once with five steam channelers and about 40 men on August 1 last, since which time the work has been pushed until the large pillar, which was last month successfully broken from its bed, was worked out.

The announcement as made by Mr. Prentice that the monolith would be loosened on Friday, Nov. 18, and on that day the public were invited to the quarry to witness the event.

Previous to the day of raising, the workmen at the quarry had carefully started the parting wedges, so that on the appointed day all that was necessary to complete the task Mr Prentice had undertaken was the successful driving of the wedges. Along each side of the monolith, which had been sawed at either end, were started about 400 leather wedges, all partly driven.

Arriving at the quarry, all that remained to be done was the giving of the signal to begin driving the wedges. There were 50 men on either side standing with mauls uplifted waiting for the word to be given to tap the entered wedges. At a signal from Mr. Prentice the mauls fell, and the work had begun. With the precision of clock work the men drove the wedges, at each succeeding blow advancing to the next wedge. At last, with a slight quiver, the huge rock parted in its entirety from the mass and lay at the bottom of the pit ready to be delivered to the State Commission, to be trimmed to the desired size.

Mr. Prentice's first proposition to furnish the monolith was for a stone just a trifle larger than the Egyptian obelisk at Rome, said to be the largest in the world, which is 105 feet feet 7 inches, exclusive of the foundation, and 9 feet square at the base. He first intended the monolith to be 106 feet in length and 9 feet 2 inches at the base, but upon a later consideration decided to have it 115 feet long, 10 feet at the base, and 4 feet square at the top. The apex will be about 5 feet long and will be tapered to about a six inch tip. The entire monolith will rest upon a foundation of granite 10 feet high and 12 feet square.

Putting in Pumping Machinery.

The pumping machinery for the World's Fair grounds is now being put in place in the building constructed for it at the northeastern end of Machinery Hall. Altogether, the apparatus in this building will have a pumping capacity of 40,000,000 gallons of water every 24 hours.

The machinery is from the works of Henry R. Worthington, New York City. There are four different types of engines to be employed. One of these, a horizontal, high duty, duplex engine with a capacity for supplying 12,500,000 gallons of water daily, is almost ready for work. It is identical with one now in use in the city of Lowell, Mass. That one was the first to successfully stand the new test (by units of heat) adopted by the Association of Mechanical Engineers of the United States.

Its two low-pressure cylinders are 50 inches in diameter and have a piston stroke of 28 inches; length of plunger, 27½ inches. The high-pressure cylinders, of which there are also two, are 25 inches in diameter. The air chamber stands 6 feet 6 inches in hight and has a diameter of 40 inches. The air in this chamber is used for feeding the compensating cylinders, which act as flywheels do on engines.

One of the problems that the engineers of the present day are trying to solve is to lessen the size of castings, engines and machinery in general, and thereby the amount of space they occupy, and yet retain as much of the power as possible. This end is in view in the pumping works to be used at the World's Fair grounds. They occupy comparatively little space for the capacity they are to develop.

The bed plate of a vertical duplex engine has just been put in position. It weighs 40,000 pounds and will support the water and the steam cylinders and all the machinery necessary to pump 15,000,000 gallons of water daily. The entire hight of this will be 49 feet 2½ inches. Of this 10 feet will be below the floor proper.

The suction pipes of both engines are 30 inches in diameter and the delivery pipes into which the water is forced from all the four engines are 46 inches in diameter. In the center of the building is a well about 18 feet in diameter from which the suction pipes draw the water. The well is connected by a tunnel with the main lagoon and the water is to be used in the fountains, &c.

The two other engines of the pumping station are a triple expansion vertical condenser and a high-speed engine with a capacity of 5,000,000 gallons a day. The foreman in charge of the works for Henry R. Worthington is William Kirkbride.

Transfer Table Ready.

The great transfer table, which is to be used in running the locomotives and coaches of the transportation exhibit on to their respective tracks, is now completed. It is about 70 feet in length, and will travel on seven pairs of wheels. The tracks upon which it will ply are situated about 2 feet lower than the tracks to be occupied by the exhibits. This allows the track on the surface of the transfer table to come on a level with those on which the exhibits are to be shunted.

Extending about three-fourths of the length of the transportation annex is a cut in the flooring about 2 feet in depth and 70 feet in width. Seven rails are laid its entire length, and it is on these that the transfer table will travel.

The table will have a carrying capacity of 200,000 pounds, or 100 tons. It will be operated by electricity, and one man will have complete control of it. According to the amount of weight on it the table can be made to travel back and forth at a speed varying from 120 feet to 225 feet per minute. When it is transferring a wagon or other light load, or is entirely empty, it will be capable of traveling at the rate of 225 feet a minute, or nearly 2½ miles per hour.

A dynamo of 30 horse-power operates the machinery. The dynamo and gearing are on a small platform attached to the car at its center. The electricity operating the dynamo is carried to it through two protected wires placed within a few inches of the ground on which the traveling table rails are laid. The dynamo is of the Thomson-Houston make, and the method by which the electricity is carried to it by the wires is known as the double trolley system. The electricity will go around the circuit of the wires and back to where it is generated. The rails will, therefore, not require to act as return circuits for the electric fluid as in the street car electric systems. The car is designed by W. L. Clements, the mechanical engineer of the Industrial Works, Bay City, Mich., which is furnishing the apparatus. The manner of shifting the locomotives, coaches, cars, wagons, &c., from the track on which they come into the yard to the one on which they are to be placed on exhibition is a very simple one. The table is run down along its bed until its surface tracks are even with those from which the exhibit is to be removed. In the machinery of the motor is a revolving drum and small, but strong, steel cable. The cable is attached to the locomotive, or whatever the exhibit is, to be drawn on. By pulling down on a small lever the man operating the motor sets the drum revolving. The cable is wound up and the locomotive drawn on to the tracks. Then the gearing is started and the table placed opposite the tracks intended for the exhibit. By running the cable of the drum around a post the locomotive is drawn off in much the same way that it was drawn on.

Geological Survey Exhibit.

A Washington dispatch says that it is the intention of the Geological Survey in its exhibit at the World's Fair to elucidate the geology of the United States, which will represent its work in both the field and the office. Mineralogy in the United States will be shown as perfectly as possible, mainly by selected specimens and not a large mass of material from any of the localities. Rocks of the United States will be shown as an educational collection. There will be displayed cases of American fossils, so arranged as to show both their distribution in the United States and their order of geological column. In connection with these will be included restorations of some of the enormous fossil animals discovered by Professor Marsh. Office work of the survey will be illustrated very largely by photographs, photographic transparencies, maps and drawings. With these will be displayed the instruments used in the work of the survey, together with a series of enlarged relief maps, constructed to show the geology and topography of the country. In addition to the collections having a purely scientific value, a collection will be prepared to show, by direct association of specimens, descriptive labels and maps, the economic resources of the United States, including ores and other minerals of commercial value, arranged so as to illustrate at a glance the wealth of the United States as regards each particular class of objects.

Two Departments Allot Space.

Assistant Chief Hornsby of the Department of Electricity will begin this week tearing up the floor of the Electricity Building in order to lay the foundation for the heavy machinery which will be installed in that building. The Electricity Department has allotted every inch of space available for exhibitors and the installation will begin at once. The whole

list of applicants has been cleaned up and each one of them knows where he will place his exhibit. Chief Barrett of the department has within the last few months left the greater part of the work to his assistant, and between the two the work of granting space to intending electric exhibitors has been pushed ahead of the other departments.

Chief Skiff of the Mines and Mining Department has completed the allotment of space in his building and began assigning it several weeks ago. Outside these two departments intending exhibitors are generally without information as to what room they will be given in the several buildings.

Chief Peabody of the Department of Liberal Arts is unable to allot space because he does not know how much room will be granted him in case the Liberal Arts Building is constructed.

Chief Allison of the Department of Manufactures is also unable to award space to applicants in his department because he does not know whether his building will be vacated by Chief Peabody.

Chief Buchanan of the Department of Agriculture has made great advancement in his work, and intending exhibitors of agricultural products will shortly know how much room they will be permitted to occupy.

Chief Allison Worked Too Hard.

Chief Allison of the Department of Manufactures is seriously ill, being confined to his bed from what his physicians pronounce to be nervous prostration. Exposition officials, while solicitous about the condition of the Chief of the Department of Manufactures, are not surprised that under the circumstances he has succumbed to overwork. Mr. Allison is at the head of the biggest department of the World's Fair. The manufacturing industries of the country have made such a material advancement within the last decade that the space provided for them has proved apparently inadequate. It has devolved upon Mr. Allison to arbitrate between the contesting claims of applicants for space. For six weeks past he has labored almost daily at his office from 9 o'clock in the morning until 12 o'clock at night. In his efforts to make an equitable distribution of space he has labored beyond the endurance of his nervous system. During Mr. Allison's illness his assistant, Frank Williams, will be in charge of the office.

A Lilliputian Engine as an Exhibit.

Chief Robinson, of the machinery department, has an exhibit which is quite unique. It is a high-pressure beam engine, constructed principally of gold and silver, and composed of over 150 pieces. The diameter of the cylinder is $\frac{1}{16}$ inch; the length of stroke, $\frac{3}{16}$ inch; the diameter of the fly wheel, $\frac{5}{8}$ inch. The cylinder cross head and beam are made of gold, and the boiler is composed of five separate sheets of silver. The screws which hold the several parts together are so small that they can scarcely be seen with the naked eye. The engine, boiler, stack and plate on which the whole rests weigh 9 pennyweights and 10 grains—less than $\frac{1}{2}$ ounce. It is believed to be the smallest working engine in the world, and will make 3000 revolutions per minute. It was constructed by Cyrus Chambers, Jr., of Philadelphia, when he was 16 years old. He is now a manufacturer of miscellaneous machinery. Chief Robinson was requested by the architects of Machinery Hall to place in the loggias of that building such machinery of a monumental type as might be appropriate, and he is wondering whether or not this exhibit might not find a fitting place in the main entrance.

Pennsylvania's Commission.

The Pennsylvania Executive Committee of the World's Fair Commission met at Harrisburg, Pa., on the 1st inst. and listened to the report of Executive Commissioner Farquhar, who says that the work is in good condition all along the line except progress on the State building. There are now on file 1088 applications for space from Pennsylvania exhibitors. The cost of building, furnishing, and maintaining the State building during the continuance of the Exhibition will be $133,000. This building will be presented to the Chicago authorities at the close of the Exposition. The estimate of expenses for transportation has been much reduced owing to the liberality of the railroads. The work of the Manufacturers' Committee is practically finished, with more applications for space than the Chicago authorities can possibly accommodate. Women's work is an uncertain quantity as yet, as a satisfactory exhibit cannot be made unless room can be secured to make it collective. Mr. Farquhar thinks that the State can make a creditable exhibit on the $100,000 appropriated to collecting, transporting and installing the work of the various departments. Prof. Louis E. Reber, in charge of the collection of mine and oil exhibits, said that the large oil and coal companies and individual operators would be fully represented, taking up all the room that could be given them. A special committee was appointed to confer with the grape-growers of the State. In concluding his report Commissioner Farquhar suggests that there will be many interesting and valuable treasures belonging to the State at the close of the great Exposition, and he recommends that they be utilized as a nucleus of a State museum to be established in Harrisburg.

The International Exhibitors' Association.

A meeting of the executive committee of the World's Fair International Exhibitors' Association was held in New York on the 30th ult. President Frederick B. Cochran presided. It was reported by Secretary P. A. Matthews that the number of intending exhibitors had complained of not having yet received any allotment of space from the World's Fair Committee in Chicago, while many Western merchants and manufacturers had received their allotments of space a year ago, and some of the Eastern manufacturers were now talking of not exhibiting at all. The committee is negotiating with railroads for special rates for shipment in carloads of exhibits from this city to Chicago. It was decided to have a special representative of the association in Chicago during the whole period of the Fair to look after the interests of the members.

Arrival of a Krupp Exhibit.

The Lehigh Valley liner "H. E. Packer" has taken to Chicago from Buffalo a curious exhibit in the way of shipbuilding for the World's Fair. It is the rudder stock and rudder forged in one piece and the sternpost and shoe forged in a solid piece of steel. The exhibit was manufactured by the Krupp Iron Works, in Germany. It weighed 40 tons and was taken up by water all the way from New York. It will remain on the deck of the "Packer" until next spring, when it will be taken by a lighter to Jackson Park. The general practice of shipbuilders is to have the rudder and rudder stock separate and joined together, and the same with the sternpost and the shoe, that part which extends from the stern of a vessel, holding the rudder in place at the bottom. They are frequently disconnected, causing great loss by boats becoming unmanageable. By the Krupp design it will be nearly impossible to lose either the rudder or shoe.

Miscellaneous.

Commissioner Simonds of the Patent Office is giving his personal attention to the supervision of the exhibit of his office at the World's Fair, and is enthusiastic over the prospects of having the finest exhibit of any of the Government bureaus. Patent Office exhibits will illustrate the marvelous rate of progress in invention of the present age and the fostering influence of the American patent system. With this end in view a committee of experts recommended the display of models in series, showing by comparison the types of all leading improvements in certain selected lines, from the germ to the perfect instrument or device. The committee is now engaged in reviewing the models on file.

Editors of trade journals are to hold a congress next year and discuss things of interest in connection with the class of journals which they represent. President Bonney has issued a circular indicating among other things the committee having the congress in charge as well as the themes to be discussed. President Bonney, in order to make the congress successful, cordially invites the co operation of all persons interested in trade journalism. He wishes them to suggest themes for discussion. Those already selected include the origin and development of the trade journal, its distinguishing features, the means to be employed for the attainment of the highest excellence and trade press associations. The committee in charge of the congress is composed of J. Fred. Waggner, chairman; David H. Mason, vice-chairman; W. D. Johnson, W. A. Kriedler and E. J. Baker.

Chief Fearn of the Department of Foreign Affairs, has received an official list of intending German exhibitors. The information was forwarded by the Imperial World's Fair Commissioner, Herr Wermuth. The total list amounted to 5007, within 3000 of the number of intending exhibitors in the United States who have up to this time applied for space. The last information from England did not afford a showing half so complimentary. France has not been heard from in regard to the number of exhibitors, and other foreign nations have also failed to indicate how many of their industrial and scientific industries would be represented.

Austria will be represented at the fair by 600 firms. Architect Bressler will have charge of the decorations. Archduke Carl Ludwig is the president of the commission and its patron.

The Brazilian Mail Steamship Company will transport all Argentine Republic exhibits free of charge.

The electric launch "Electra," the successful competitor in the trial tests made at Chicago during the past summer on the Lagoons at the World's Fair grounds, was found to be best suited to fulfill all the requirements of passenger traffic on the water ways of the Fair Grounds, and as a consequence 50 will now be built at once, 25 by the Detroit Boat Works and 25 by the Racine Hardware Mfg. Company, after the design of the "Electra." Her principal dimensions are: Length over all, 34 feet, and beam, 6 feet. She carries 78 storage cells, each of 125 ampère hours, capacity, developing a total energy of 2250 watt hours. The propeller shaft is of rolled Tobin bronze. During the trial she made a continuous run of 10 miles, carrying a load of 25 people. The speed on the Lagoons was limited to six miles an hour, and for a short distance she made from 9 to 11 miles an hour. The motor and other electrical devices were designed by the Electric Launch & Navigation Company, and the hull, propeller, &c., by Gardner & Mosher. The electric launch "Corcyra," recently built for J. J. Astor, is fitted up with the same electrical apparatus and machinery as the "Electra."

The First American Casting.

C. J. H. Woodbury of Boston delivered on October 21 an address on the Saugus Iron Works at Lynn, Mass., at the presentation to the city of Lynn of the first casting made in America. We are indebted to Mr. Woodbury for a photograph of this article, from which the accompanying engraving has been prepared :

A few months ago I learned that Messrs. Arthur and Llewellyn Lewis, the owners of the kettle well known as being the first casting made at the Saugus Iron Works, were seriously considering the acceptance of one of several offers recently made for its purchase; and as it appeared to me that this article, which was the precursor of the vast iron industry in America, should be kept at Lynn, where it properly belonged as a relic most closely affiliated with the early history of our town, I at once purchased the kettle.

Some of the citizens to whom the facts were submitted at a later day joined in the expenses involved in the purchase and mounting of the kettle in a suitable case for its presentation to the city, but before the whole affair was consummated John E. Hudson, now a resident of Boston, but born in Lynn, and for many years a resident of this city, claimed the privilege of making the gift to his birthplace.

His interest in the matter was a deep one, as he is a direct descendant of Thomas Hudson, the owner of the site upon which the Saugus Iron Works were built, and his request was conceded by the original subscribers, who now offer the case in which the kettle is placed for safe preservation.

The case is presented by Messrs. Charles H. Aborn, George D. Barnard, Hon Francis W. Breed, Hon. William A. Clark, Jr.; Charles A. Coffin, Alfred Cross, Benjamin W. Currier, B. V. French, William G. S. Keene, Patrick Lennox, John T. Moulton, William H. Niles, E. Wilbur Rice, Jr.; Joseph N. Smith, Benjamin F. Spinney, Henry B. Sprague, Joseph F. Swain, David H. Sweetser, Henry F. Tapley, Charles B. Tebbetts, Prof. Elihu Thomson, Col. Roland G. Usher, C. J. H. Woodbury, John P. Woodbury and Mark J. Worthley.

As the kettle is an example of the state of the art of iron founding in 1642, so the tablet, forming the rear of the case, is also typical of the skill of American foundrymen in 1892. It is as it came from the mold at the foundry of the Magee Furnace Company at Chelsea, untouched by tools, and has been treated by the Bower-Barff process, covering it with the magnetic oxide of iron to prevent corrosion.

There are some original features in the design of this tablet, particularly in the groundwork of the face, of which the pattern was woven bamboo, and the back is in like manner an impression of plaited straw, instead of the tooled surfaces which are used for similar tablets.

The tablet bears the following inscription:

THE FIRST CASTING MADE
IN AMERICA.
SAUGUS IRON WORKS,
1642.
PRESENTED TO THE CITY OF LYNN
BY
JOHN E. HUDSON,
A DESCENDANT OF
THOMAS HUDSON,
THE OWNER OF THE SITE OF THE
IRON WORKS, TO WHOM THE FIRST
CASTING WAS GIVEN.
THIS CASE PRESENTED BY
CITIZENS OF LYNN.
1892.

It may be very naturally asked what is the evidence warranting the presumption that this kettle is as claimed the first casting made at the Saugus Iron Works.

Thomas Hudson owned 60 acres of land on the westerly bank of the Saugus River, at the present sites of Scott's and of Pranker's mills, and he sold this land to the company of undertakers for the iron works. He claimed in consideration the first article made at the works, and although not given to idealisms, this kettle was kept by him and his descendants in the male line for over a century, when it passed in the fourth generation to Mary Hudson Lewis, who gave it to her daughter, Mary Lewis, and she in turn gave it to her nephews, Arthur and Llewellyn Lewis, from whom the purchase was made.

These two brothers well remember the story of the kettle as told by their grandmother, who prized this kettle as an heirloom, whose history had, in a like manner, been related to her by her grandparents.

The first published record of this kettle is contained under date of 1642 in the history of Lynn, by Alonzo Lewis, 1844, page 122. The same is included in Lewis' and Newhall's history of Lynn (1890), page 208, and is referred to in every history treating of the Saugus Iron Works. The "Standard History of Essex County," C. F. Jewett (1878), of which the chapters upon Lynn were prepared by the late Cyrus Mason Tracy, contains (page 246) a description of this kettle, and I have in my possession a manuscript written by Mr. Tracy in 1881, in which that able antiquary eloquently referred to it as "the humble prototype of the immense iron industry that now extends over our land."

Further references on this subject may be made to Vol. I, page 408, of the "History of Essex County, Massachusetts" (J. W. Lewis, Philadelphia, 1888), in which the chapters on Saugus were written by Wilbur F. Newhall, Esq.

The Saugus Iron Works were such an important factor in the inception and early development of American industries that their early history merits due consideration. This was not the first attempt at iron smelting, but the first success.

The bog iron deposits in the upper Saugus meadows were discovered by Thomas Dexter, one of the colonists, and he informed his fellow-townsman, Capt. Robert Bridges, who went to London and formed the company of the undertakers for the iron works, which was started under the management of these two men, with Joseph Jenks, one of the best workmen of the day, as master mechanic.

Capt. Robert Bridges was one of the leading men of the settlement, having been intrusted with diplomatic offices on the part of the colony of Massachusetts Bay, and of whom it was said by Nathan M. Hawkes: "No man who lacked suavity and winning social manners could have persuaded calculating London merchants to have ventured their dearly loved funds in an iron works experiment across the Atlantic in a savage and unknown land." (*Magazine of American History*, Vol. XXV., page 150.)

The site of the iron works was well selected, being situated at the head of navigation, by the ford in the highway from Boston to Salem, at a water power, and near to the bog iron ore deposits, whose exact location is unknown, save that they were in Adam Hawkes' meadows. The whole iron works tract probably covered 3000 acres.

The General Court granted them at various times immunity from import or export duties, and from taxation, and other privileges. I believe that the act of October 14, 1645, is the earliest instance of legislation upon the principles of protection to manufacturers, which has been such an important feature in development of American industries. The act is a long document, but the following extracts are of especial interest:

"5. . . . They shall have free liberty to transport the same (their iron) by shipping to other parts or places of the world, and to make sale thereof. . . . Provided they sell it not to any person or state in actual hostility with us.

"7. It is also granted that the undertakers and adventurers, together with their agents, servants and assigns, shall be and are hereby free from taxes, assessments, contributions and other public charges whatsoever, for so much of their stock and goods as may be employed in and about the said iron works, for and during the period of 21 years yet to come from the date of their presents"

There is not any detailed description of the works and the exact methods employed, but there is much light thrown upon these matters in the voluminous records of continual legislation and litigation which took place during the 46 years that the works were in operation.

The works contained a blast furnace, in which bog iron ore was reduced by means of charcoal, using as a flux lime, which in the earliest days of the works was obtained from the oyster shells, which then abounded on the coast of Massachusetts Bay. Cannon were also melted at this foundry, far in advance of the time when swords were to be beaten into ploughshares, or spears into pruning hooks.

The iron from the blast furnace was run into straight trenches in the sand, and thereby cast into long triangular bars called "sowe iron," which were converted into wrought iron and steel. Castings were made directly from the metal flowing from the blast furnace into a pool, whence it was dipped by crucibles and poured into the molds. The cupola furnace was not invented until 1790.

The manufacture of wrought iron and steel must have been entered upon contemporaneously with that of cast iron, as John Endicott of Salem, the first Governor of Massachusetts Bay, wrote to Gov. John Winthrop, at Boston, December 1, 1642: "I wish to hear much of your son's iron and steel;" the son being John Winthrop, Jr., who was interested in the Saugus Iron Works.

The wrought iron and steel were made in a blomary, which may be described as a charcoal fire 4 feet thick in a blacksmith's forge. The end of a bar of sow iron was plunged into the fire, and in time a pasty mass of wrought iron would settle to the bottom. Other portions of the bar would be converted into steel when the process stopped at the intermediary stage between cast and wrought iron. This process of steel making is still used throughout the Oriental nations and also in the mountainous region south of the Ohio River.

The iron works also included a machine shop, in which the first fire engines made in America were built for the Town of Boston, in accordance with a vote of the town meeting, March 1, 1654, that "The select (men) have power and liberty to agree with Joseph Jynks for Ingins to convey water in case of fire, if they see cause so to do." (Brayley, "History Boston Fire Department," 1889, page 7.)

Although the iron works were in operation very soon after building was commenced, yet additions were made during a number of years. In 1645 an order of the General Court shows that the works had "some tons of sowe iron cast and some others in readiness for the forge," and letters of Governor Winthrop in August and September, 1648, state that the furnace produced 7 to 8 tons per week. The principal product was bar iron "as good as the Spanish," costing £20 per ton, also axes and agricultural implements.

When Gov. John Endicott began the oak tree and pine tree coinage in 1652, the dies were made by Joseph Jenks at the Saugus Iron Works. ("Early Coins of America," S. S. Crosby, Boston, 1875, p. 79.)

It is stated by Judge James R. Newhall that the designs were made by Elizabeth, the wife of Joseph Jenks, the master mechanic. (Lin, 1880, p. 78.) This coinage, bearing the stamp "Massachusetts State," without any reference to the throne, was probably the first fundamental act of independence to the mother country. The colonists were driven to such a course by the lack of money, as exchanges were for the most part carried on in barter with bullets and wampum serving for small coin.

Joseph Jenks also invented a sawmill, which received a patent for 14 years from the General Court on June 10, 1646, being the first patent granted in America, and also a water engine for mills, which was undoubtedly a form of water wheel and not the hydraulic engine which that term would now signify.

He also invented the modern American scythe, long and narrow and stiffened by a ridge along the back, a marked improvement "for the more speedie cutting of grasse" over the broad, short bushwack scythe made from a thin plate of steel, and richly deserved the patent for seven years which was granted by the General Court, May 23, 1655.

In 1667 he petitioned the General Court relative to a wire manufactory; and May 15, 1672, his petition for authority to coin money was refused.

The litigation to which the iron works were subjected increased and became oppressive. It appears as if the impulse to "sue the corporation" was instinctive among the townspeople. The corporation, its managers, and its workmen were proceeded against under every conceivable excuse. The boundaries of worthless land, poor crops on sterile soil, unrestrained courtships, speaking lightly of the Governor, reproachfully of the Church and harshly of the king, were all subjects of long continued and bitter litigation.

Land was sold to the corporation and afterward further damages claimed. Dexter brought suit because the alewives did not come into his net below the dam as of yore, and Hawkes sued because the water rose too high above the dam. The town sued the corporation for pew rents in a meeting house several miles distant, and notwithstanding the immunity in the act of October 14, 1645, already quoted in part, won the case. The pews could not have been worn much, for the courts took action against the managers for not attending public worship.

THE FIRST CASTING MADE IN AMERICA.

The works are not known to have been in operation after 1688, when the tract had diminished to 600 acres and passed into individual ownership. If the supply of bog iron ore had been sufficient for the works, they would undoubtedly have been continued the same as other enterprises of that day in various parts of New England.

The immediate return to those engaged in the enterprise is now of little moment, but the results to the whole colony of an establishment which attracted, developed and then scattered a body of skilled mechanics were of great importance and no doubt many have been an essential factor in rearing many prominent industries.

Announcement is made that the University of Chicago will shortly receive from the William B. Ogden estate the munificent bequest of $500,000. The Ogden Scientific School of the university is to receive this amount as an addition to its endowment fund. The new institution of learning in the Western metropolis thus starts off under most encouraging auspices. One department after another is being placed on a most substantial financial basis, and the moving spirits in the enterprise are confident that funds will be secured in Chicago for erecting the necessary buildings as fast as the money may be needed. Class instruction has already begun in the university's own buildings, some of which are in a sufficiently advanced state to be used for that purpose.

The Stimson Institute for Artist-Artisans.

As an advisory committee the following gentlemen have issued an appeal in behalf of the Stimson Institute for Artist-Artisans:

Ex-Gov. Joshua L. Chamberlain, president, late president of Bowdoin College; Horace J. Fairchild, treasurer, third vice-president H. B. Claflin Company; Henry R. Elliot, secretary, editor *Dry Goods Economist*; John W. Stimson, educational director; Rev. Dr. R. Heber Newton; Gen. Alexander S. Webb, president College of the City of New York; Frederick Shonnard, president of Yonkers Board of Education; John Baynes, president of Mosaic & Tracery Company; Louis de Goll, agent Roy Watch Case Company, and John S. Parish, city editor *Record and Guide*.

The institute was founded four years since to provide American labor with the facilities for acquiring skill and taste in design. In four years over 400 students have been educated.

At present the teaching force consists of 12 specialists, in charge of Mr. Stimson, and a numerous and enthusiastic body of pupils drawn from all parts of the United States is in attendance. The range of instruction embraces architecture, sculpture, painting and drawing in all their forms, book illustration and covering, wood carving, wall paper designing and mural decoration; silk, calico, cretonne and carpet designing; ceramic, tile and porcelain work; metal and jewelry designing, with other ornamental domestic arts where now we are obliged to employ foreign skill if we require first-class work. What is immediately needed to put this institute on a sure foundation is practical support by men who appreciate what is being done abroad and what must be done at home in the line of the technical education of the artisan.

The Northern Steamship Company propose to put on the great lakes six of the finest passenger steamers ever built for the navigation of American waters. They will run between Buffalo and Duluth, 1100 miles. Work on two of the boats has already been begun at the shipyards of the Globe Iron Works, Cleveland. The vessels will each have twin screws and three smoke stacks. They will be equipped with the finest appointments and will cost nearly $600,000 each. They will have the Belleville boilers, so generally used in the French navy, which are over a third lighter than the ordinary steel boiler, and are considered non-explosive. Quadruple expansion engines, capable of developing 6500 horse-power, will be used. The speed of the boats will be 20 miles an hour.

The municipal authorities decide that the Harlem River drawbridges must remain closed during the busy hours night and morning. The arrangement will enable the railroads to arrange their schedules so that their important trains may not be subject to delay.

A contract for the building of the new City Hall in Jersey City has been awarded to C. A. Bouton & Co. for $237,000.

The Utilization of Niagara Falls.

(With Supplement.)

It is not the purpose in the following article to deal in any way with the history of Niagara Falls. The object is to present an account of the inception and development of the plan, to utilize the Falls, which is now nearing completion, incidentally mentioning, as a sort of preface, some of the most important schemes which have been proposed of late years:

Early Projects.

The eminent engineer, Sir William Siemens, is reported to have said that if all the daily output of coal in the world could be used in making steam to drive pumps it would barely suffice to pump back the water flowing down Niagara River. It has been the dream of both experts and laymen when viewing this vast fall of water from the banks to long for the privilege of using at least a small part of the great energy going to waste. We therefore find that schemes innumerable and of every conceivable description have been brought forward, discussed and for some all-sufficient reason discarded. It has always been conceded that as a first essential to the employment of any part of this water for the generation of power the picturesque aspect of the scene should not be in any way interfered with. This universal opinion has led directly to the condemnation of many of the plans proposed, whose projectors, seeing only the commercial side of the problem and the business advantages to be derived, had no eye for the beauties of the scene, which they were willing to sacrifice in order to gain their own ends.

Some 40 years ago the so called hydraulic canal, operating factories about ½ mile below the falls, was built. This canal is 50 feet wide by 6 feet deep, and the total horse-power obtained from it is only about 6000. The engineer of to day, examining this plant and from the gorge below the falls viewing the vast volume of water that issues from below the factory sites, shudders when he realizes that this volume with a head of 100 feet is permitted to fall without doing any work. Up to the present time this has been the only scheme which has been carried to any state of perfection for the utilization of a part of the water. We understand that this plant, or more generally speaking the several plants depending on the canal for their power supply, will be overhauled and arranged more in accordance with modern engineering ideas.

The Plans Now Being Developed.

Thomas Evershed, formerly State Engineer of New York, proposed some years since a method of utilizing the falls that possessed many most admirable features. In the first place, it detracted nothing from the beauty of the scenery, in fact being unnoticed by the tourist, and, secondly, it provided for obtaining an almost unlimited power. The direct outgrowth of the plan then proposed is the scheme now being carried forward. A charter was granted in 1886 to the Niagara River Hydraulic Power & Sewer Company of Niagara Falls, N. Y., the successor of which company is the present Niagara Falls Power Company. In brief, the plans consist in building a canal a little over a mile above the falls, of course on the American side, taking the water from this canal in vertical shafts united at their bottom by tunnels leading to one main tunnel or raceway, having its outfall about 1000 feet below the falls. The builders of this work are the Cataract Construction Company, having for its staff the following prominent engineers: Albert H. Porter, chief engineer; Coleman Sellers, John Bogart and Theo. Turrettini, consulting engineers; Geo. B. Burbank, resident engineer, and Prof. Geo. Forbes, consulting electrical engineer, Clemens Herschel being the hydraulic engineer.

The first work done by the company was the securing of a large strip of land along upper Niagara River and extending some distance back from the shore. The acquiring of this property was necessary in order to fully carry out the plans decided upon. In a general way these plans consisted in furnishing sites for factories and a sufficient amount of water to run these factories, the development of the power being left to the owner of the factory.

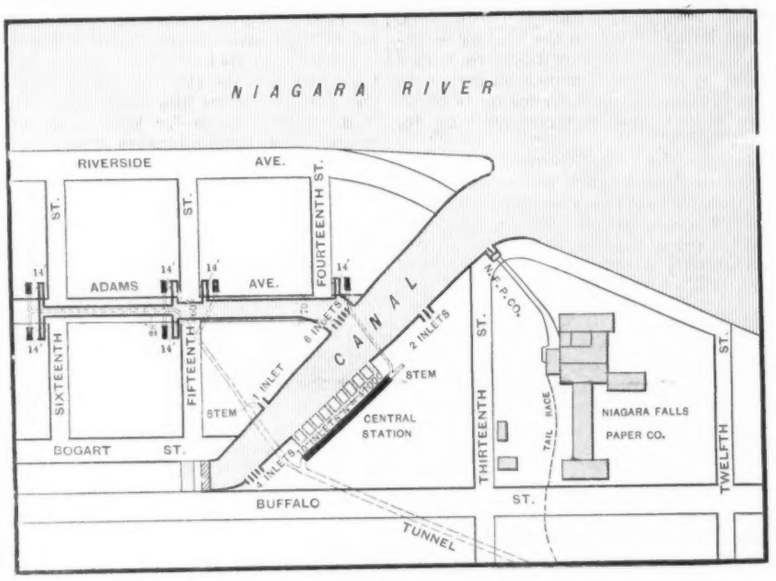


Fig. 1.—Map.

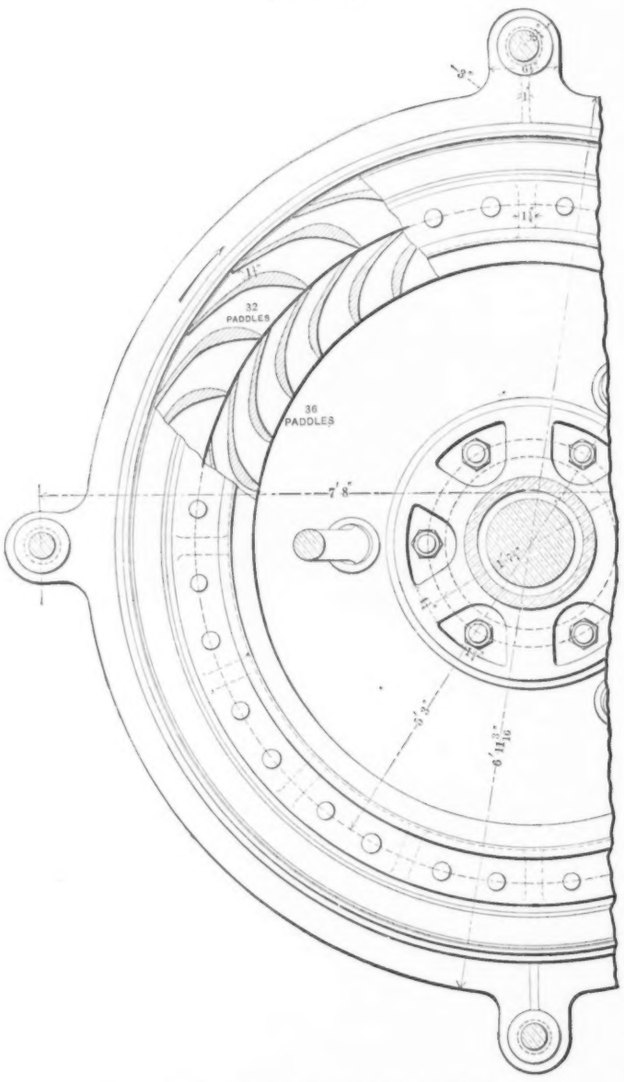
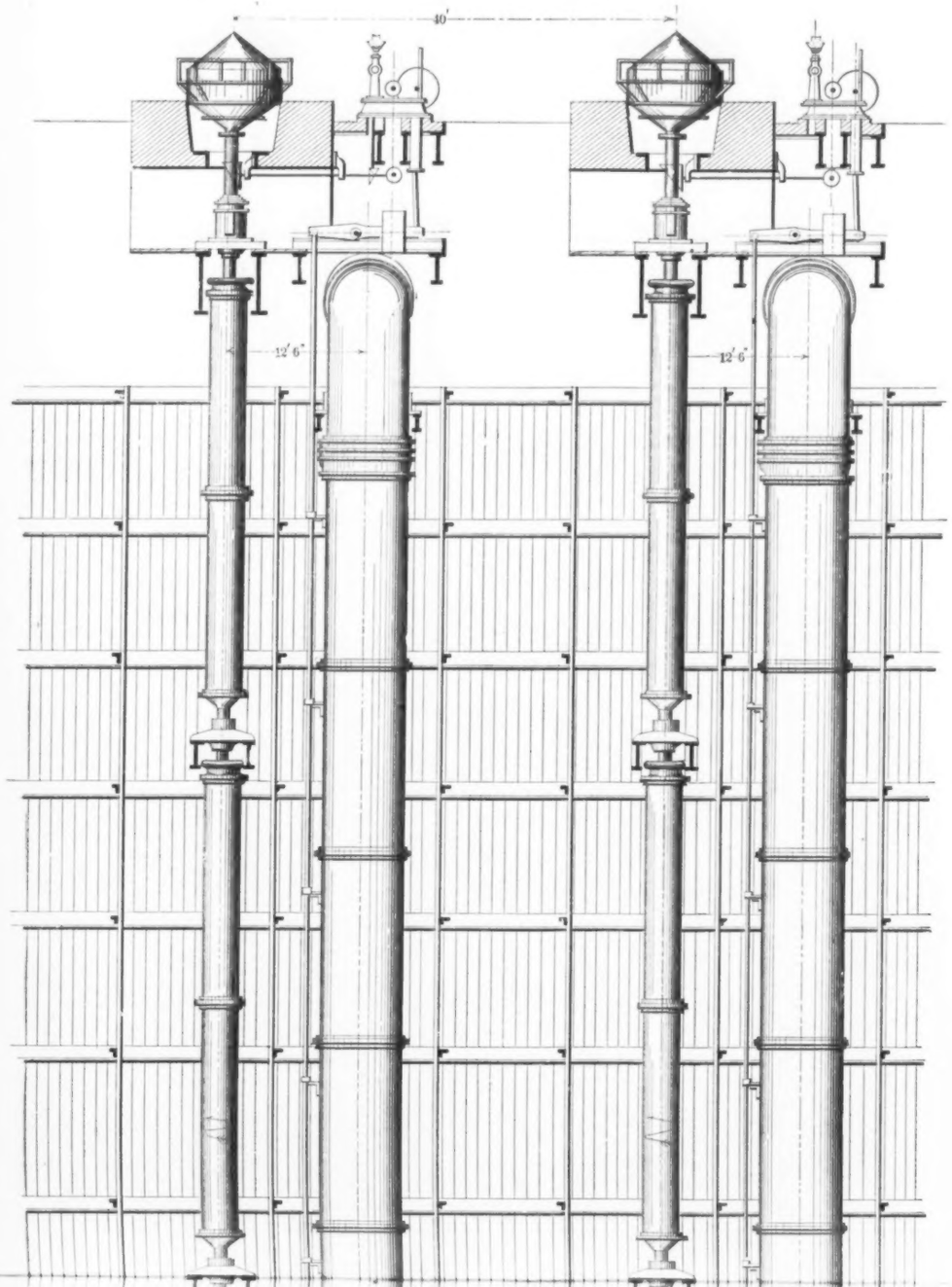
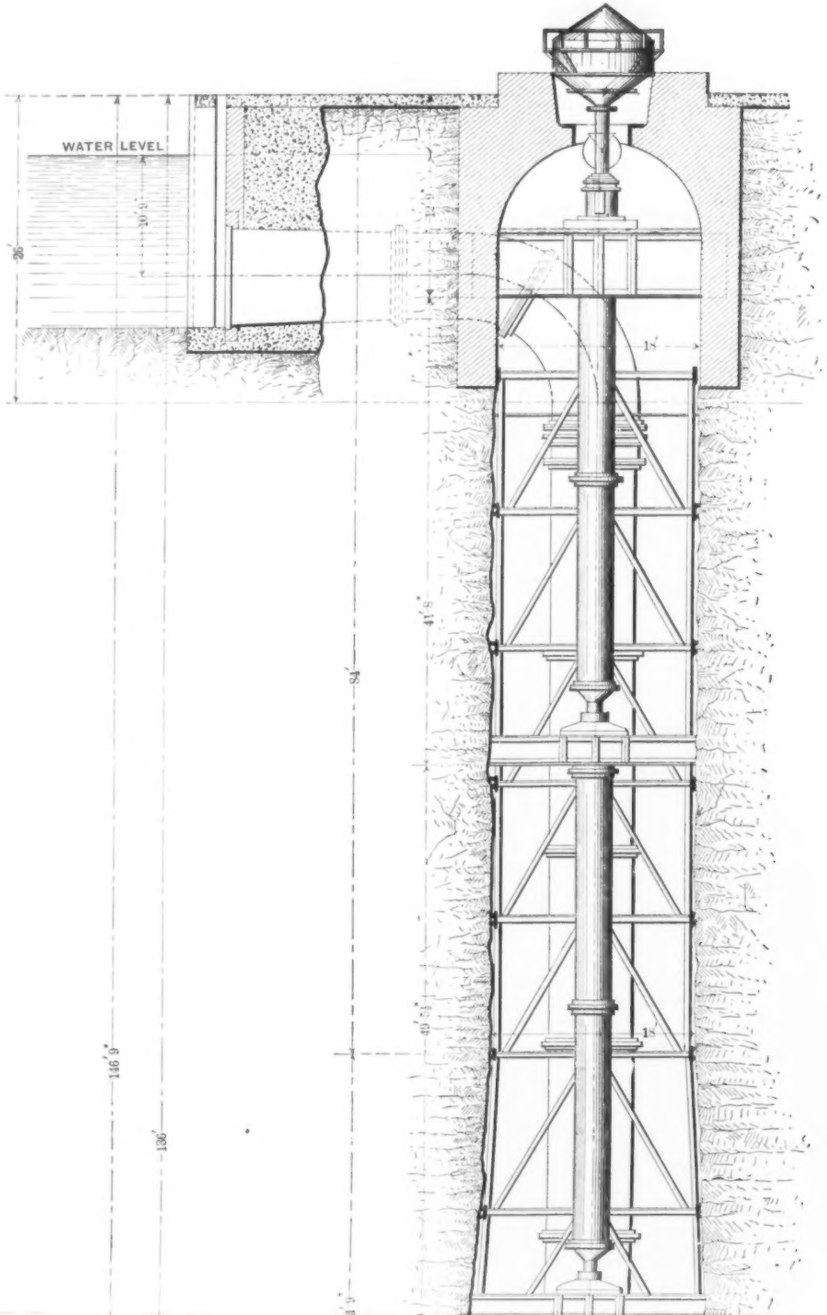


Fig. 6.—Half Sectional Plan of Wheel.


40'
12'6"
12'6"


WATER LEVEL
30'
26'
18'
18'
41'6"
84'
49'6"
146'9"
136'

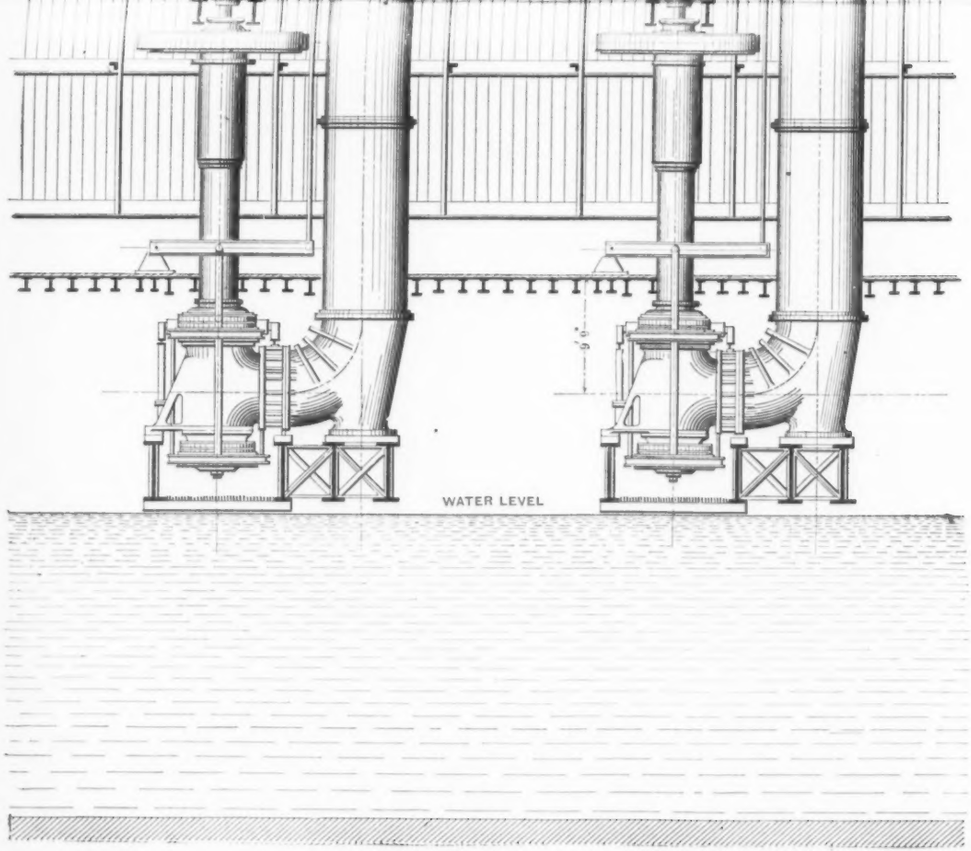


FIG. 2.—VERTICAL LONGITUDINAL SECTION.

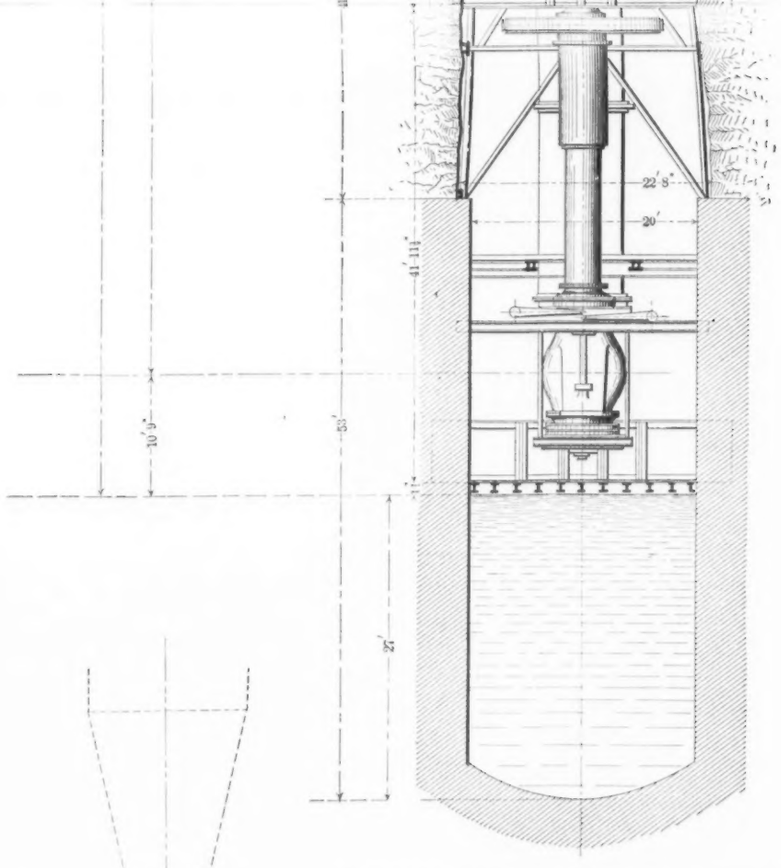


FIG. 3.—VERTICAL TRANSVERSE SECTION.

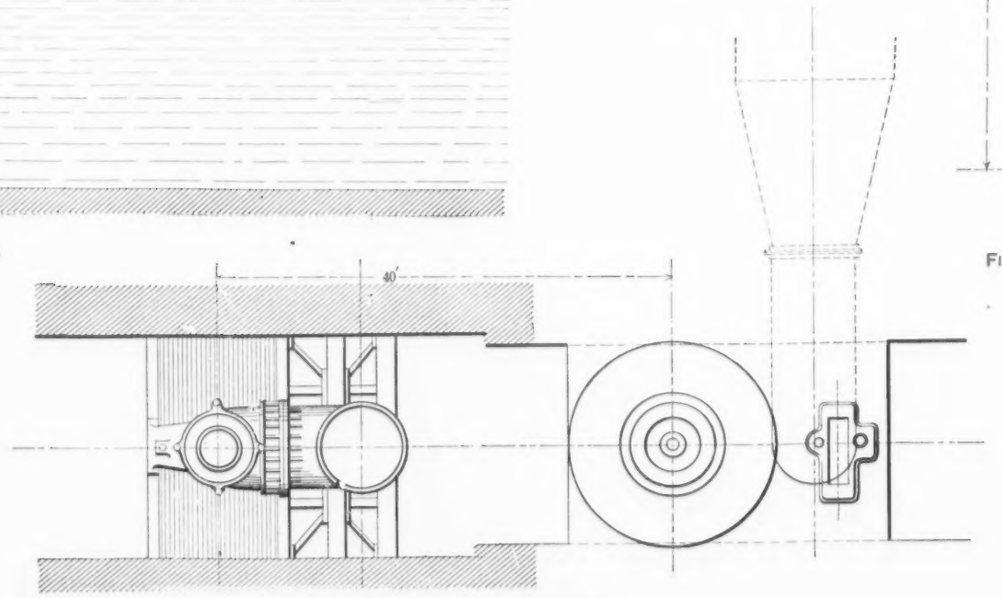


FIG. 4.—SECTIONAL PLAN.

THE UTILIZATION OF NIAGARA FALLS.—5000 HORSE-POWER TURBINES.

The second part of the programme contemplates the generation of power by the company and its transmission to and final utilization at any desired points. The plans, it will be noticed, therefore divide themselves into two distinct parts, one in which the water is delivered to the factory by the company, and after it has been used for the development of power its conveying away through the tunnel built by the company. This is a mere bringing to and taking away from a particular location a certain quantity of water. In the second electricity will be generated by the company and then transmitted through suitable conductors to any particular site desired. As an illustration of the adoption of the first method, we may state that the Niagara Falls Paper Company very early acquired land adjoining the canal and began work on their own shafts and buildings. They have let contracts to R. D. Wood & Co. of Philadelphia for the furnishing of turbines for the development of 3000 horse power under a head of 140 feet, having the privilege of increasing this by 3000 more if required. Owing to the fact that this company early recognized the feasibility of the methods proposed and the reliability of those having the matter in charge, they received rates for power which probably places their annual cost per horse-power at lower than any other company in the United States which may be said to purchase its power direct.

The First Steps.

The first work, or more properly speaking, preliminary work, connected with these plans was the examination by E. D. Adams, the president of the company, and Coleman Sellers, of the principal methods of utilizing a fall of water. For this purpose these gentlemen visited Europe and carefully inspected the plans there in operation, particularly the methods carried out in Switzerland for making available their many water falls. Owing to the vast volume of water placed at the disposal of the company at Niagara and the unprecedented amount of power it was desired to develop, there was no precedent found, and, therefore, in a certain sense the work is experimental. Studying the plans employed for the development of 1000 horse power forms, no guide where it is necessary to develop with a fall of 150 feet over 100,000 horse-power. Further than this, a vitally essential part of the question was the transmission of this power after its development, and this formed one of the most important parts of the subject looked into. It was finally decided to appoint an international Niagara commission, composed of men of eminent talent, who were to invite plans from the most prominent and competent engineers of the world. This commission consisted of Sir William Thomson, as president; Prof. E. Mascart, of the College of France, Paris; Col. Theo. Turrettini of Geneva, who carried out the great works of improvement of the Rhone and Lake at Geneva; Coleman Sellers, Professor of Engineering Practice at Stevens Institute of Technology, and W. C. Unwin, Professor of Engineering at the Central Institution of the City and Guilds of London, who served as secretary to the commission. This commission was instructed to call for plans which were to consider the best methods of developing the power and the best methods for its transmission. The commission furnished what we may term an outline of the work to be accomplished.

a. For hydraulic projects for the primary development of power by turbines or other water motors.

b. Projects for the transmission and distribution of power from the primary.

c. Projects combining both development and transmission.

The following data were furnished by the company:

1. Unlimited and never-failing water, with a comparatively small amount of sediment.

2. Constant net fall of 140 feet.

3. A tail race or tunnel about 6700 feet long, with a section 490 feet square, and a hydraulic gradient of about 7 feet per 1000.

4. About 10 feet of soil overlays the rock.

Projects were invited for one central station located at the head of the tunnel; for the economical development of as much power as possible, and, finally, for the transmission and distribution of the power overhead, underground, electricity, air, water, cable or other means.

The following table gives in brief and easily consulted form the names of the several firms who entered plans, an outline of their method of obtaining power, and also of distribution.

Projects Received by the Commission.

Name	Generator.	Distribution.
Guenod, Sautter & Co. and Faesch & Piccard	Impulse turbines of 2500 horse-power, with horizontal shafts.	
Guenod, Sautter & Co. and Faesch & Piccard	Impulse turbines of 2500 horse-power, with vertical shafts	Constant potential dynamos, 1600 volts. Dynamos, 5000 volts.
Vigreux & Levy	Axial flow turbines of 2500 horse-power, horizontal shafts	Continuous-current dynamos, 5000 volts.
Hillairet & Bouvier	10,000 horse-power turbines on vertical shafts.	10,000 horse-power dynamos, giving 7000 ampères at 1000 volts, with moter transformers.
Popp & Riedler	Axial flow-pressure turbines of 5000 horse-power.	Multiple stage air compressors, 5000 horse-power each.
Pearsall	Air compressed in cylinder by direct action of water pressure to 150 pounds. Pressure water is also supplied in same way.	
Lupton & Sturgeon	Inverted flow pressure turbines of 3750 horse-power, with vertical shafts.	Single-acting air compressor, delivering air at 5½ atmospheres.
Ganz & Co	Partial flow impulse turbines 5000 horse-power, with vertical shafts.	Alternate-current dynamos, 336 ampères, 10,000 volts.
Escher, Wyss & Co	Axial flow pressure turbines, vertical shafts, 2500 to 10,000 horse-power.	
Rieler & Co	Pressure turbine, 2000 horse-power vertical shaft. Also 2500 and 5000 horse-power, with horizontal shaft.	Cable transmission.
Vigreux & Feray	Partial admission turbines, 2503 horse-power, horizontal shaft.	
Pelton Water Wheel Company	Pelton wheels of 4000 horse-power, horizontal shafts	Direct-driven hydraulic pump, giving 710-pound pressure. Air compressors. Hydraulic pumps. Dynamos.
Forbes	Turbines.	Alternating dynamos, 3000 volts.
Norwalk Iron Works	Pelton water wheels, 5000 horse-power.	Compressors furnishing air at 147 pounds.

It will be seen by consulting this table that the method most favorably considered for the generation of the power was turbine water wheels, the majority of the firms entering plans of this description. In the order of their importance, the methods of distribution were by means of electricity, compressed air and cable transmission.

Awards by the Commission.

No first prize was awarded for any plan combining the development of power and its transmission. One second prize of £500 was divided between two firms—Faesch & Piccard and Cuenod, Sautter & Co., of Geneva, Switzerand, who acted together. Four third prizes of £200 each were awarded to the following: Hillairet & Bouvier, Paris; V. Popp & Levy, Paris; Pelton Water Wheel Company, San Francisco, and the Norwalk Iron Works Company of Norwalk, Ct. For the proposals to utilize power, a first prize was granted to Escher, Wyss & Co. of Zurich, and second prizes to Ganz & Co., Budapest; Professor Lupton of Leeds and J. Sturgeon of Leeds. No prize was awarded for the distribution of power.

One of the most important factors was the transmission of power from the bottom of the shaft, where it would be developed, to the top. Evidently, the use of turbine wheels of great power called for a correspondingly large vertical shaft, and in order to reduce friction created by the great weight of this shaft, several plans proposed forcing fluid between the bearing surfaces and converting the bearings into so-called fluid bearings. This method was opposed by others, who proposed to so construct the wheels that the water entering them would not only accomplish its work in the turning of the turbine, but also serve to lift the shaft and thereby relieve the bearings of undue friction.

General Aspect.

There is a fall of 326 feet between Lake Erie and Lake Ontario, most of which occurs in the vicinity of Niagara Falls. The Horseshoe Falls, in the center of which the international boundary passes, are 158 feet high and 2600 feet wide, the American Falls being 169 feet high and 1000 feet wide. The estimated flow of water is 265,000 cubic feet per second, and to develop 120,000 horse-power (we may state in parenthesis that this was afterward reduced to 100,000 horse-power) with the head of water available and with an efficiency of 75 per cent. would require 10,200 cubic feet per second, or less than 4 per cent. of the average flow. As to whether the taking of this amount from the falls would be perceptible to the visitor we have the opinion of John Bogart, formerly State Engineer of New York, who in a letter under date of December 1, 1890, to Andrew H. Green, President of the Commissioners of State Reservation at Niagara Falls, said:

"The amount that can be taken by the tunnel now under construction if developed to its full capacity may be 10,000 cubic feet per second. This is 3.64 per cent. of the whole flow. The actual depth of water at the crest of the Falls cannot be accurately observed except near the sides of the Falls. The depth varies considerable at different points on the crest. A calculation based upon the observed facts gives 6.22 as an approximate mean depth of water, a very short distance (less than 10 feet) above the edge or crest of the Falls when the present mean volume of water is passing over and 6.07 as the depth at the same point when the volume shall be reduced by the amount that could be taken by the tunnel referred to.

"Therefore the depth of water along the whole Falls just above the crest may be reduced 1¾ inches by the diversion of water into the tunnel.

"From the operation of a well-known hydraulic law, the depth of water directly

over the crest will be somewhat less, the velocity being greater, but the decrease of depth at that point by the diversion of the water will also be less. It might be suggested that as the proposed tunnel may divert 3.64 per cent. of the total volume of water the depth at the Falls would be decreased by the same percentage; that is, 3.64 per cent. of 6 22 feet, which would give a decrease of 2.7 inches. But in fact the decreased volume will give a decreased velocity and therefore a greater relative depth at the crest. I therefore think that 1¾ inches is the probable amount of the mean reduction in depth at the Falls to be caused by the tunnel diversion.

"In conclusion, it is my opinion that the amount of water that can be taken through this tunnel will not affect the depth of water flowing over the falls to an extent that will be noticeable."

Work Begun.

October 4, 1890, work was begun on the tunnel, which was finished two years later, or last October. The work contemplated consisted in building about a mile above the falls a canal having an entrance of about 200 feet and extending inland about 1200 feet, as shown in the map, Fig. 1. This canal is intended to direct the water from the river to several well-pits, the exact location of which is a future consideration, but an idea of which may be obtained from the map. It will be noticed that at the junction of Fourteenth street and Adams avenue there are marked six inlets, these being intended to supply a canal extending along Adams avenue and having pits located as shown, the bottom of these pits being connected with the main tunnel as indicated by the dotted lines. Of course this plan may be changed somewhat as the plan develops, yet it serves to illustrate how the power may be distributed. The company is now building on the other side of the canal and nearer the inlet a central station in which will immediately be placed two turbines capable of developing 5000 horse-power each and which we shall describe further on in this article, and also eight other shafts in which similar wheels will be placed as required, making the total power to be developed at this central station 50,000 horse.

Leading from the bottom of these shafts is the main tunnel, which extends to a point about 1000 feet below the falls, almost directly under the American end of the small suspension bridge, this tunnel, of course, serving the purpose of a tail race in removing the water after it has accomplished its work.

The tunnel is horseshoe in section, having a cross-sectional area of 365 feet, and measuring 21 feet in hight by 19 feet in width. Its entire length is 6700 feet, the grade being 7 feet to the 1000. It is lined throughout with 16 inches of hard brick, this having been found necessary because the rock passed through disintegrated or crumbled quickly when exposed to the air. Specimens of this brick work taken from the tunnel during the opening of the tunnel leading from the pits of the Niagara Paper Company, the location of which is shown on the map, show that work of an unusually solid character had been performed by the builders. The brick and hydraulic cement had united to form a mass as solid as rock. All this work has been completed, and it now only remains to place the turbines in position, connect them with suitable dynamos and distribute the power.

5000 Horse-Power Turbines.

In the accompanying drawings we present all the principal features of the 5000 horse-power turbines, the contract for the building of two of which has been let to I. P. Morris & Co. of Philadelphia. The vast magnitude of these wheels, taken as a whole, the great weights necessary in order to insure the strength required, and the unusual conditions under which they are placed, make their study one of unusual interest. They were designed by Faesch & Piccard of Geneva, Switzerland, who furnished complete working drawings which were submitted to prominent engineering concerns of this country for bids for building, the contract being let as stated above.

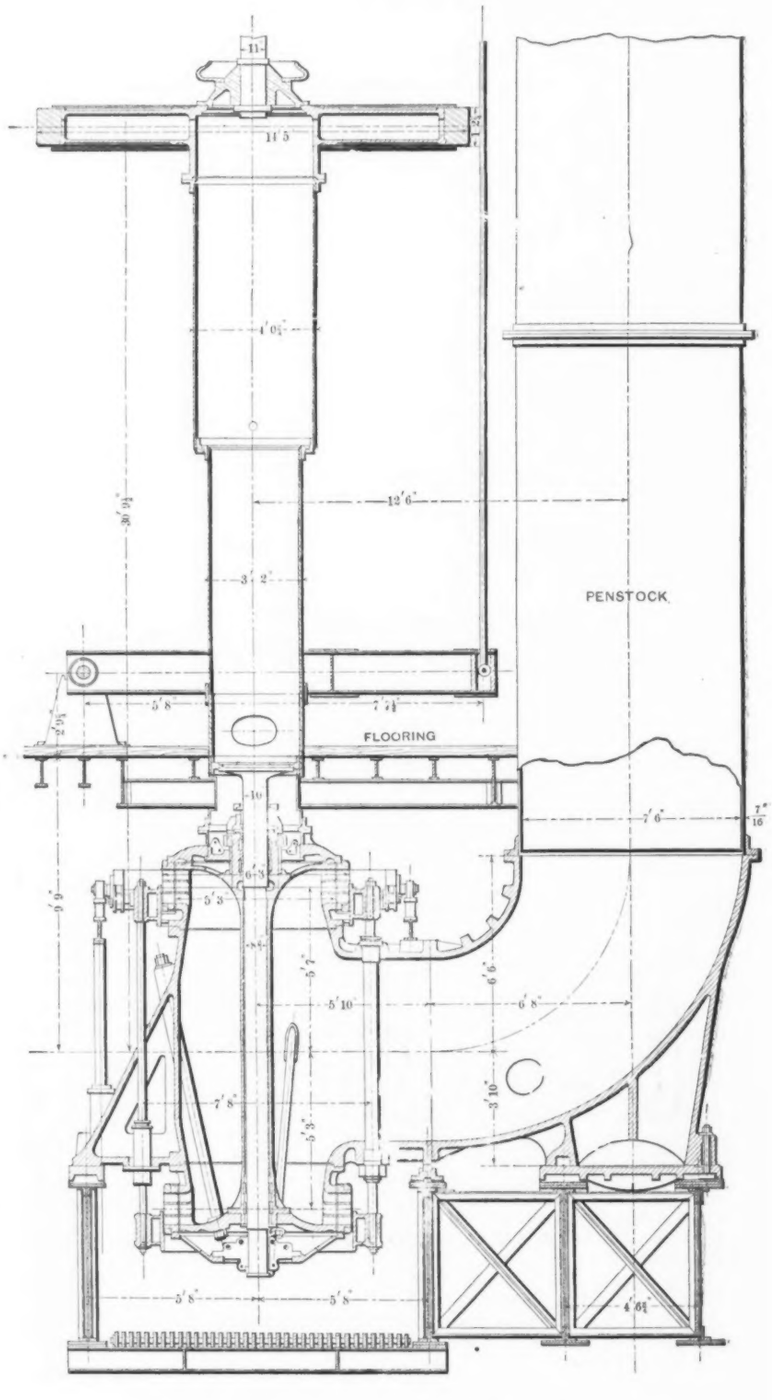


Fig. 5.—Longitudinal Section of Turbines.

The general arrangement of these turbines in relation to the shaft they are placed in will be seen from Figs. 2, 3 and 4 on the accompanying inset sheet. Each turbine operates under an average head of 136 feet and develops 5000 horse-power at 250 revolutions per minute. The volume of water passing through each wheel amounts to 430 cubic feet per second. Each wheel is mounted on a vertical shaft and is placed at a depth of 141 feet below water level. It operates a dynamo located at the top of the shaft and the armature of which is coupled directly to the shaft of the turbine. Two bronze wheels, placed one above the other, as shown in Fig. 5, are coupled to this shaft. These wheels are shown in detail in Figs. 6 and 7, the method of connecting the lower wheel with the shaft being clearly brought out in detail in Fig. 7. These wheels are reaction wheels, the water being arranged radially over the interior and over the wheel periphery, being guided to the wheel by 36 paddles arranged as shown in the sectional plan view of the wheel. This drawing also shows the form of the 32 paddles forming the wheel proper. Thanks to this arrangement, the pressure of the

water on the wheels is completely equalized.

A 7½ foot vertical plate steel pipe, shown in Figs. 2, 3 and 5, conducts the water from the canal to a chamber between the two distributors; thence the water passes through distributors and the wheels and falls into the tail race leading into the great canal. The main shaft is 135 feet long and is made of steel tubes 38 inches in diameter. Eleven-inch solid shafts are interposed at the points where the guides are located. This method of construction makes it possible to considerably diminish the weight of the shaft while increasing its rigidity and also in reducing the number of guides necessary. In order to insure uniformity in the speed a heavy fly wheel is attached to the shaft, as shown near the lower part in Figs. 2 and 3. This wheel is of forged iron, has a diameter of 14½ feet, weighs 10 tons, and has a peripheral speed of 11,000 feet a second. The upper bearing of the shaft is, while the turbine is running, completely relieved of its load, because the pressure of the water acts vertically on the lower surface of the upper wheel and thus balances the considerable weight of the revolving part of the turbine and of the dynamo. All the bearings are provided with automatic lubrication.

The speed is regulated by means of circular guides surrounding the wheels, but having a slight play between them. They have vertical movement, and can thus more or less completely cover the openings and act to throttle, if we may use the term, the discharge of the water. They are completely balanced, as the pressure of water delivered from the wheels acts uniformly on the inner surface. The openings of the wheels and of the distributors are divided into three parts with the object of reducing the efficiency by only a small quantity when the turbines are not running to full capacity, the action of the regulator operating only on one part at a time.

An automatic regulator or governor, shown in Figs. 9, 10 and 11, is placed above ground beside the dynamo and is coupled to this device, which it controls by means of levers, &c. This regulator is of a new type and is patented. It is extremely sensitive to variation in speed and in electrical installation does very good service. The speed varies between a maximum of ½ per cent. at a normal rate of working, and at about 3 per cent. if the capacity of the turbine is increased or diminished suddenly by one-quarter. This is a remarkable result for a regulator for a hydraulic motor. The patents on this governor are controlled by the designers of the turbines, Faesch & Piccard. The index, Fig. 10, gives the key to the several metals entering into the construction of the wheels.

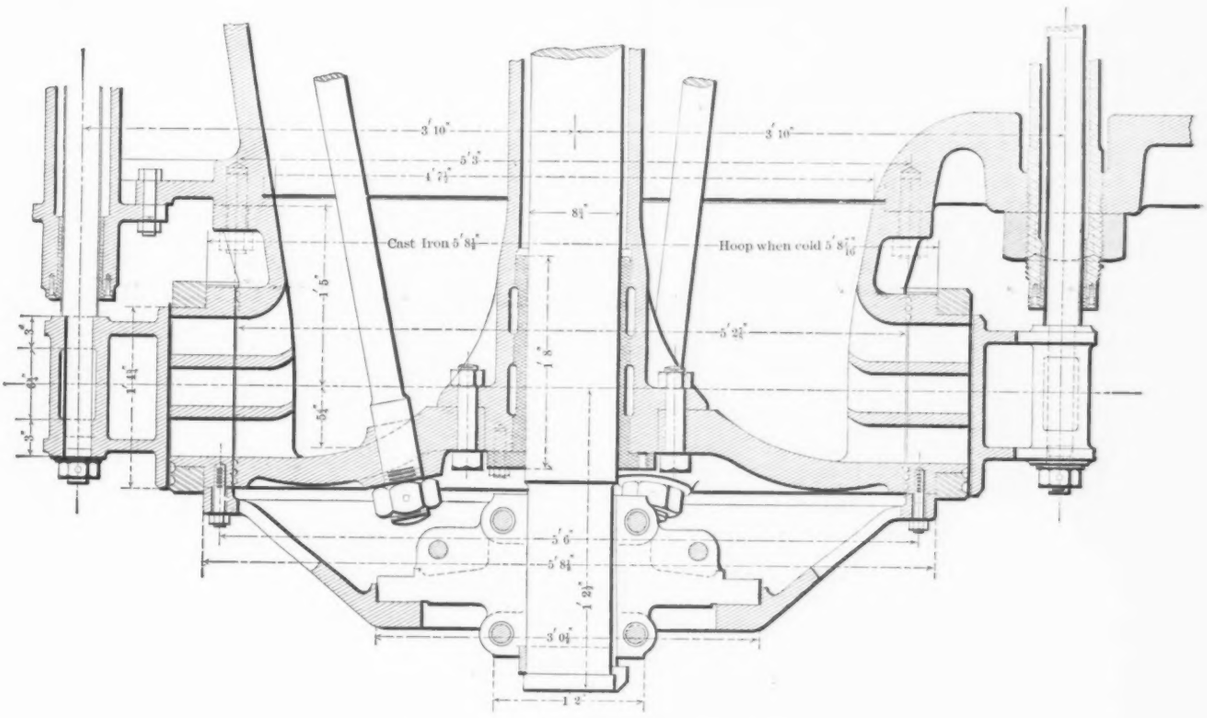


Fig. 7.—Vertical Section through Lower Wheel.

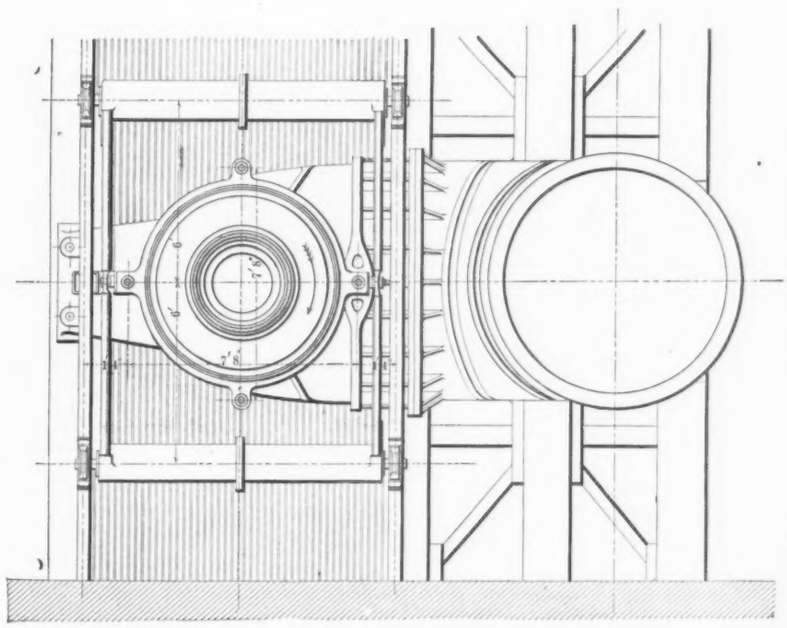


Fig. 8.—Plan View of Turbine.

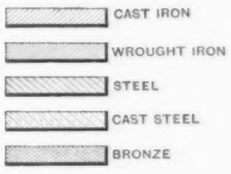


Fig. 12.—Index of Materials.

The United Portable Hoisting Engineers filed a certificate of incorporation with the Secretary of State at Albany, N. Y., De-

cember 2. The objects of the corporation are to promote closer social relationship among members of the engineering profession and for their mutual benefit and advantage. The trustees are John K. Simpkins, Andrew Walker, John McDonald, Frank O'Brien, Harvey Robinson, all of New York.

Pneumatic Pumping Apparatus.—II.

As before stated, where economy of fuel is the principal disideratum, the pneumatic pump cannot compete with other types in which steam power is applied directly to actuating the pump mechanism; but, as in mine pumping, this feature frequently becomes of secondary importanceas compared with high efficiency, and to this field of operation the pneumatic system is admirably adapted. In the gold and silver mining regions of the West there are many instances of rich mines, the working of which has been abandoned on account of the difficulty of controlling the water accumulation, and the mines have become flooded or "drowned" in consequence. In some cases the owners would gladly resume operations were it not for the apparently hopeless task of reducing and maintaining the water level at the necessary point. For such cases the pneumatic pump is well fitted. As its great capacity gives rapid working, while its entire freedom from working parts, save such as are contained within itself, will enable it to be used without difficulty, even though the water level be up to mouth of shaft. By suspending the apparatus from a proper support on the surface and making flexible air connections, it may be lowered as the water level is reduced, and when finally the bottom is reached it may be set on any apology for a foundation, and kept in continuous operation for months without difficulty. Of course, with any of the more economical types of pumps of equal capacity it would be necessary to have them set; and that, too, above the water level, so that the extreme limit of reduction in level possible for each setting would be the hight of effective suction, less than 30 feet. In setting the pneumatic pump permanently in the mine it may be placed in such a position that neither the machine itself nor the single water and two air pipes will obstruct the shaft. This, of course, is true also of the direct-acting steam pumps, but instead of conveying compressed air, in which there is no loss, the pipes will be used for steam, and no matter how carefully they are jacketed, the loss from condensation must be very considerable—to say nothing of the necessity of providing for removal of the water caused by it. In order to convey a definite idea of some points of comparison between the pneumatic and the older systems, we may look at some figures on the subject; and, as a case in point, may use the calculations recently made for Messrs. Riggs and Strong (late of Hercules Iron Works, Chicago), by whom the patents are owned. The estimate was for a mine pump of 3,000,000 gallons capacity (in 24 hours), the water to be elevated 500 feet vertically and discharged at a point 3000 feet horizontally from vertical pipe; pipe, 12 inches diameter, wrought iron. By way of comparison an estimate was made of a Cornish pumping engine necessary to do the work at a single, continuous lift—a summary of the figures for which are also given. The required duty, in the various denominations necessary to the calculation, is $\frac{3{,}000{,}000 \text{ gallons}}{24 \text{ hours} \times 60 \text{ minutes}} = 2083\frac{1}{3}$ gallons per minute, and $2083\frac{1}{3}$ gallons $\times$ 231 cubic inches $= 481{,}250$ cubic inches per minute; $\frac{481{,}250}{1728} = 278.5$ cubic feet $\times$ 62.5 pounds $= 17{,}406.25$ pounds per minute $\times$ 500 feet $= 8{,}703{,}125$ foot pounds + 10 per cent. total friction head $= 9{,}573{,}437.5$ foot pounds per minute, total. Velocity in 12 inch pipe $= \frac{481{,}250 \text{ cubic inches}}{(12 \text{ inches diameter} = 113 \text{ square inches}) \div (12 \text{ inches} \times 60 \text{ seconds})} = 5.914$ feet per second. The calculations for total frictional and velocity heads need not be given in detail. They amount to 38.29 feet $\times \left(\frac{62.5 \text{ pounds}}{144 \text{ inches}} = .434 \text{ pounds per foot}\right) = 17.0345 + 217 =$ about 8 per cent. of static head. The allowance for this item may be 10 per cent., to give safe margin. The total pressure due to weight and volume of water is 500 feet $\times$ 0.434 pound $=$ 217 pounds + 10 per cent. $= 238$ pounds per square inch, total. The required duty, then, is $2083\frac{1}{3}$ gallons $= 481{,}250$ cubic inches $= 17{,}406.25$ pounds $= 9{,}573{,}437.5$ foot pounds per minute; velocity, 5.914 feet per second; pressure, 238 pounds per square inch. To calculate, first, the pneumatic apparatus necessary for above duty, we will assume that the reversal in water cylinders takes place 5 times per minute, or once every 12 seconds. Then $\frac{278.5 \text{ cubic feet per minute}}{5 \text{ reverses per minute}} = 55.7$ cubic feet volume of cylinder $\div$ (38 inches diameter $= 7.875$ square feet area) $= 7.07$ feet. As only about 90 per cent of the volume will be effective, $\frac{7.07}{0.90} \times 12 = 93.36$ inches, say 96 inches high $\times$ 38 inches diameter.

We have, then, two cylinders 38 inches diameter by 96 inches high, for the pump. Then to calculate the air compressors necessary for the duty, we must remember that the entire pressure of the air in the pump cylinders after the water is displaced is recovered. As the calculations for showing what proportion this represents of the total work of compressors necessary were the volume not recovered are quite voluminous, it will be sufficient to state that it amounts to about 25 per cent. To ascertain the number of cubic inches of free air necessary to make 1 cubic inch at the required pressure above vacuum, we add to the previously ascertained pressure (238 pounds above atmosphere) the atmospheric pressure (14.7 pounds) and divide the sum by the same figure. Thus, $\frac{238 + 14.7}{14.7} = 17.24$ cubic inches of free air to 1 cubic inch at 238 pounds above atmospheric, or technically expressed, 17.24 atmospheres' pressure. From this must be deducted the 25 per cent recovered $= 17.24 - \frac{17.24}{4} = 12.93$ atmospheres net. This also represents the mean maximum pressure on air pistons during the 12 seconds, interval between re-

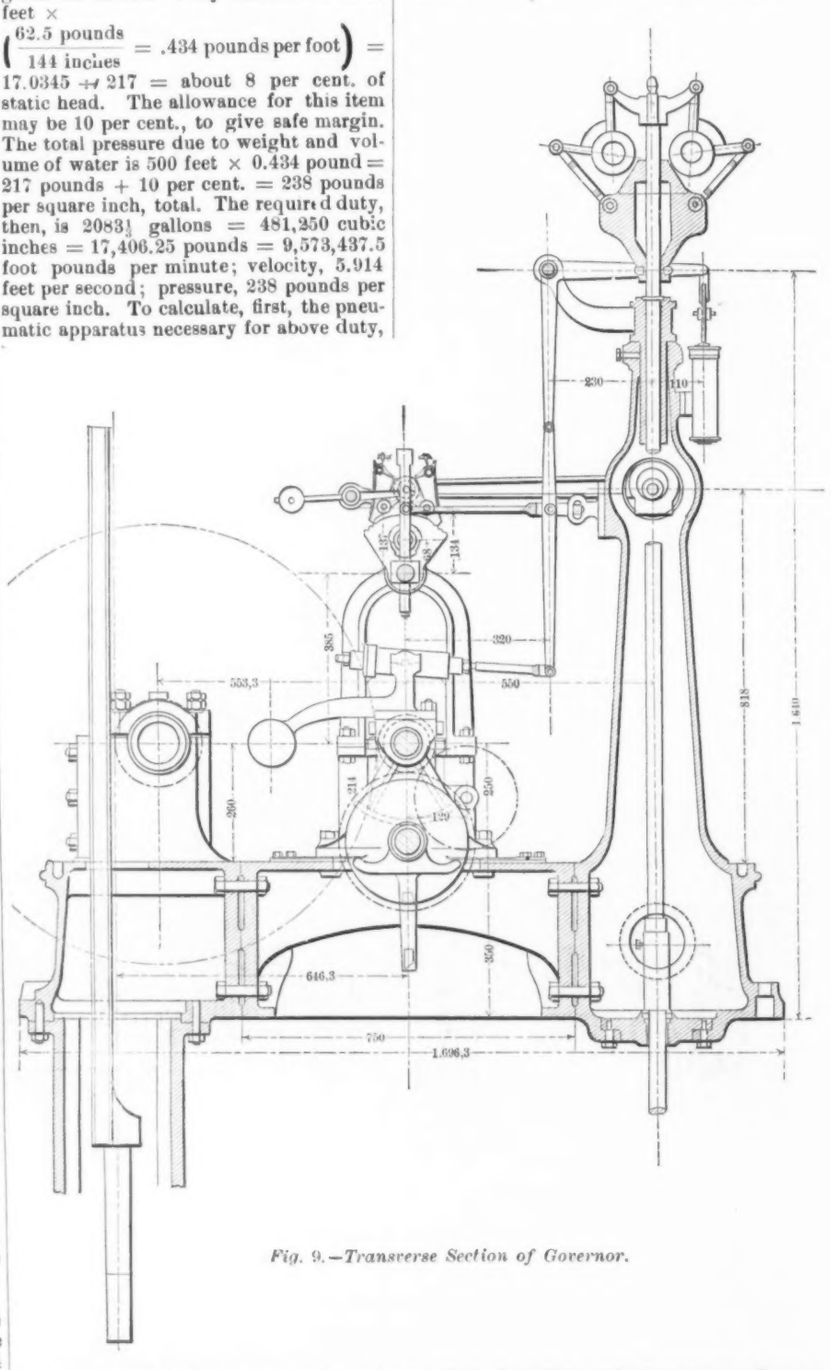


Fig. 9.—Transverse Section of Governor.

versals. To find the volume of compression cylinders required to discharge 481,250 × 12.93 = 6222562.5 cubic inches of air, it is necessary to consider the percentage of efficiency of the compressor. Ordinarily this would be figured at 60 per cent., but in this connection the loss will not be nearly so great, and it may be taken at 88 per cent. By adding 12 per cent. to above number we have the total capacity per minute required for the work = 6,969,270 cubic inches. Dividing this amount by an assumed number of cylinders × their area × length of stroke, in inches, we have the number of single strokes per minute. Thus with a duplex double-acting compressor = 2 cylinders × (29 inches diameter = 660.5 square inches area) × 36 inch stroke, we have 146.5 strokes or 73.25 revolutions per minute. To find the size of steam cylinder necessary for the 29 × 36 inch double-acting air cylinder, we must first ascertain the total pressure on air piston during the entire stroke. To do this we will improvise a formula. Let $R = \sqrt{\frac{P}{N}}$ = Ratio of pis-

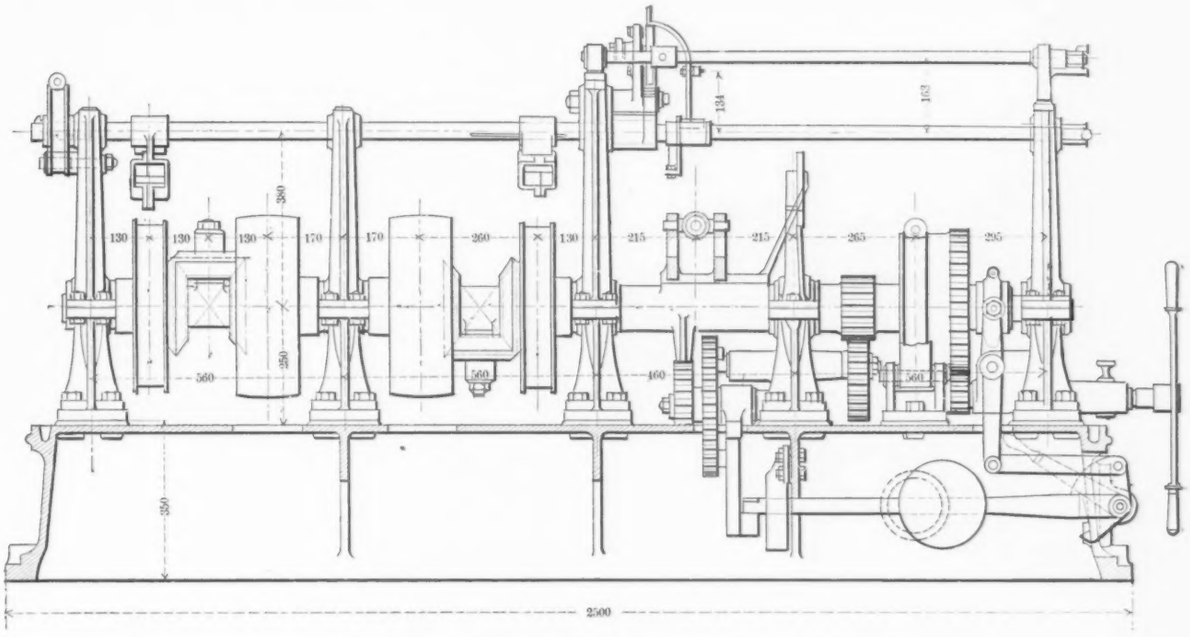


Fig. 10.—Elevation and Longitudinal Section of Governor.

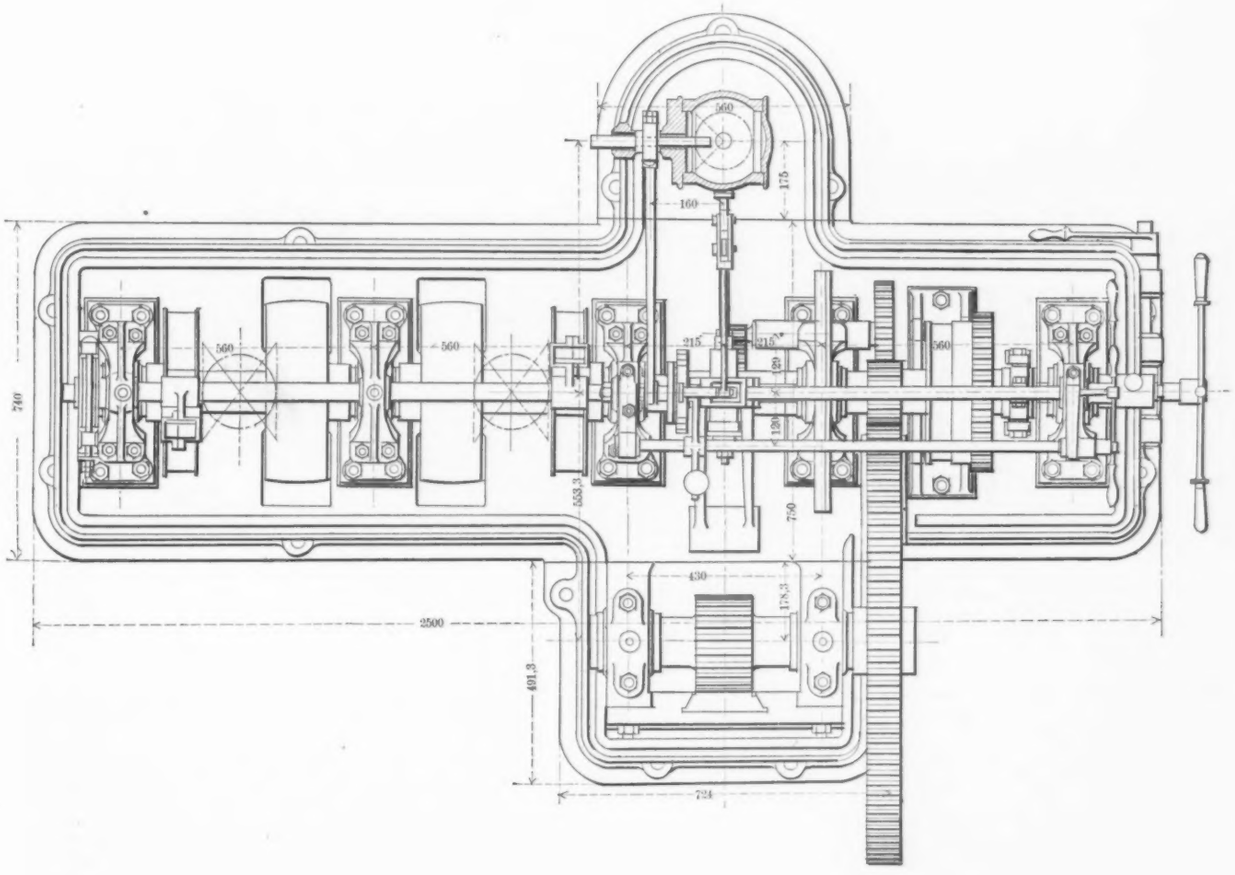


Fig. 11.—Plan View of Governor.

ton travel, when maximum pressure is reached.

P = maximum or working pressure above vacuum. N = atmospheric pressure. S = stroke of piston in feet. H = hyperbolic logarithm of R. M P = mean pressure per square inch.

Then:

$$\left.\begin{array}{l} P = 238 + 14.7 = 252.7 \text{ lb.} \\ R = \sqrt{\frac{252.7}{14.7}} = 4.152 \text{ or} \\ 3 \text{ ft.} - \frac{3}{4.152} = 2.2775 \text{ ft.} \\ N = 14.7 \text{ lb.} \\ S = 3 \text{ feet.} \\ H = 1.4231. \end{array}\right\} \quad M.P = \frac{P\left(\frac{S}{R} \times 1 + H\right)}{S} =$$

$$\frac{252.7 \times \left(\frac{3}{2.2775} \times 1 + 1.4231\right)}{3} = 150.7 \text{ lb above vacuum, say 150 lb.}$$

Then 150 pounds × 660.5 square inches = 99,075 pounds total mean pressure during stroke. To this must be added, say 5 per cent. friction = 104,029 pounds, and 10 per cent. velocity = 114,432 pounds total. With steam at 50 pounds M. E. P. (above vacuum) = $\frac{114,432}{50}$ = 2288.64 square inches = say 54 inches diameter steam piston. This calculation for single compression is hypothetical, as such high pressures require compound compressors. It serves, however, to give some idea of the size of plant necessary for this exceptionally high duty. The calculation for compound plant gives the following summary: Two pair duplex (four cylinders) 24 inches diameter × 36 inch stroke at about 73 revolutions. Of course, the engines would be of the compound condensing type, and the size given would therefore apply to the high pressure cylinder only. The size of Cornish engine required for the same duty would be for steam cylinder 60 inches diameter and 10 feet stroke, at 100 feet per minute. The size of plunger 23 inches diameter × 10 feet stroke; the weight of which, with necessary ballast being 110,450 pounds or 55 tons. It will be seen, therefore, that the actual cost of pneumatic plant ready for operation, will be much less than that of the Cornish engine, with its costly foundations, and extra strength of discharge pipe necessary to bear the shock of water column at closing of valves.

Multiple Horizontal Car Borer.

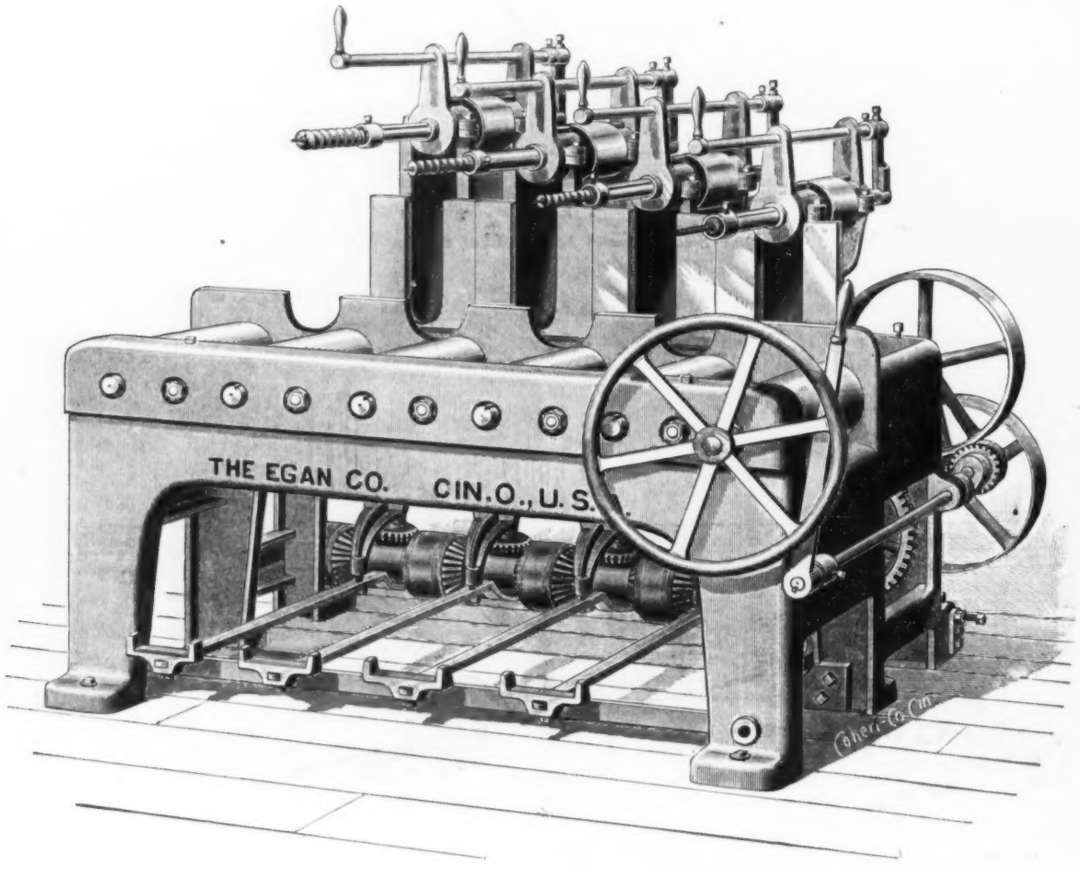
The new multiple horizontal car borer, here illustrated, is a powerful machine, especially adapted for car and bridge work and general work.

The column is one heavy casting, planed perfectly true for the mandrel frames to raise and lower and in keeping the same perfectly rigid. Each mandrel frame is raised and lowered by a combination of gears and friction, operated independently by foot power, within convenient reach of the operator.

The roller frame is of large size, extra heavy, and carries six large feed rolls, driven by power in either direction, or by hand at the will of the operator. The spindles are of steel, of large diameter, brought to the work by hand, and stops provided for gauging the depth of boring.

The machine is of large capacity. Holes can be bored as close as 9 inches and 16 inches deep, and each spindle will raise 14 inches above the table.

The tight and loose pulleys are 18 x 5½ inches and make 450 revolutions per minute. This machine is built by the Egan Company of Cincinnati, Ohio.



MULTIPLE HORIZONTAL CAR BORER.

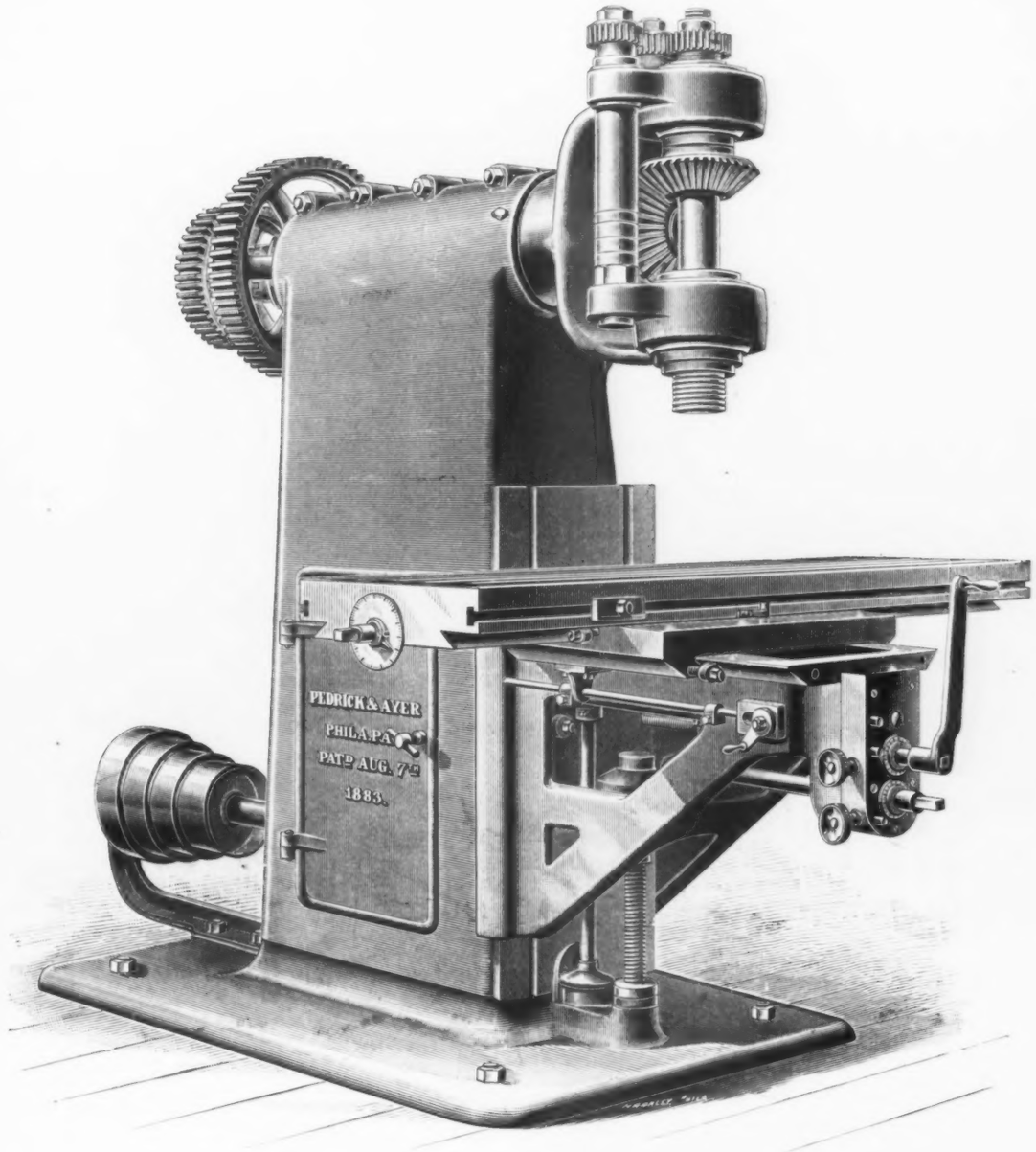
The great Red River Valley in North Dakota is described as being the garden spot of the wheat-producing Northwest. From Grand Forks, the center of this valley, the wheat lands extend 1000 miles northwest into the Saskatchewan Province. From Winnipeg, at the northern end, to Breckinridge, on the south at the head of the valley, it is 250 miles, of which 190 miles is south of the 49th parallel and equally divided between Minnesota and North Dakota, for the Red River forms the State boundary line, rising as it does 100 miles south of the Mississippi's source. Thirty miles on each side extends the level valley. Every town has one or more elevators holding 800,000 to 1,000,000 bushels, and often there is a bank where farmers are the depositors. Eleven successive and successful wheat crops have created a substantial community. A total failure of the crops in any part of the State has never been recorded. This year's product of the valley region proper is estimated at 50,000,000 bushels. The Minneapolis Wheat Board sold 72,000,000 bushels during the crop year ending August 31, 1892. This is the greatest wheat exchange on the continent, and represents actual wheat sales. Yet this is only 8,000,000 bushels more than the State of North Dakota alone produced.

The New Jersey State Board of Arbitrators appointed under a law passed last winter consists of three members, of whom J. P. McDonnell, a newspaper editor at Paterson, is chairman.

Heavy Vertical Milling Machine.

Pedrick & Ayer of 1001 and 1003 Hamilton street, Philadelphia, have recently introduced the milling machine of which an engraving is here presented.

This machine is designed for doing a great variety of heavy work, face milling, circular or profile work, rack cutting, &c. The head is graduated and can be set in any position of a circle. It has a locking device when set as a vertical machine. The shank of this swivel head is 8 inches diameter and is firmly clamped in position by the four bolts on top of machine. The driving shaft running through it is 2½ inches diameter, with self oiling bearings lined with bronze. The main spindle is 3½ inches diameter and $6\frac{5}{16}$ inches long at lower journal, and $2\frac{9}{16}$ inches diameter and 5⅝ inches long at upper journal, having a taper hole in it 12 inches long, 2 inches at large end and 1½ inch at small end, with $1\frac{1}{16}$-inch hole through it for driving out arbors, &c. End of spindle is threaded to receive large inserted face mills. Machine is driven by a four-step cone, largest diameter of which is 13 inches and smallest 7 inches, for 3¾-inch belt. It is back geared 4 to 1. Back gears are operated by a clutch similar to some screw machines. It has eight speeds and 32 changes of feed, with 2 inch belt. The platen is 14 inches wide and 48 inches long with automatic feed in either direction, fed by a screw with a clutch nut, which allows the screw to revolve without moving the table. By connecting the end of screw by gearing a circular motion can be imparted to a circular attachment placed on the table. The table and plate have a movement on top to and from the face of column of 12 inches and has automatic feed and automatic stops, which are very essential when cutting racks, &c. It also has a power up-and-down feed of 19½ inches, allowing the operator to raise and lower by power for different positions; the face of the column has two T-slots for bolts to firmly clamp the knee and column together for very heavy work, taking the strain off the gibs. All the angles are 45°, with wide surfaces, and all wear is taken up by steel or bronze wedge gibs, and are adjusted by studs and nuts from the end and by an ingenious method are oiled, so that in moving the oil is not scraped off. All small miter gears and clutches of feed are made and cut from bar steel; dials on all feeds read $\frac{1}{1000}$ inch. Weight of machine about 4500 pounds. A countershaft, driven by clutch pulleys, self-oiling hangers, wrenches and an 8 inch plain vise accompany each machine.



HEAVY UNIVERSAL MILLING MACHINE.

Horizontal Boring and Drilling Machine

This machine (Fig. 2), also made by Pedrick & Ayer, is capable of boring or drilling in the center of 58 inches in diameter from main table, from supplementary table 46 feet in diameter. Spindle has traverse of 24 inches to 48 inches, as desired, eight changes of speed, three changes of feed to each change of speed, a slow or rapid movement by hand operated from either side of the machine. The revolving sleeve surrounding the spindle has a face plate to which a facing head may be attached. The main table is 6 feet long x 22 inches wide, and is raised and

lowered by two geared screws 3½ inches in diameter, and can be raised or adjusted from either side on one end. A supplementary table is furnished that can be placed in any position on the main table, and has a cross movement by screw at right angles to the boring bar, the outer end of which is supported by an adjustable yoke, which affords great stiffness to bar and table and can be removed when desired. The main dimensions of the machine are: Base plate, 5 inches deep, 8 feet 7½ inches long and 22 inches wide; hight of spindle from base plate, 47 inches; face of column, 47 inches high, 16 inches wide and (2) T slots; length of bearing of face of column, 18 inches; length of table, 6 feet; width of table, 22 inches; diameter of elevating screws, 3½ inches; vertical movement of table, 29 inches; travel of feed rack, from 2 feet to 4 feet; diameter of movable bar, 2½ inches; changes of speed, 8 to 24; floor space, 13 feet 7 inches x 32 inches wide.

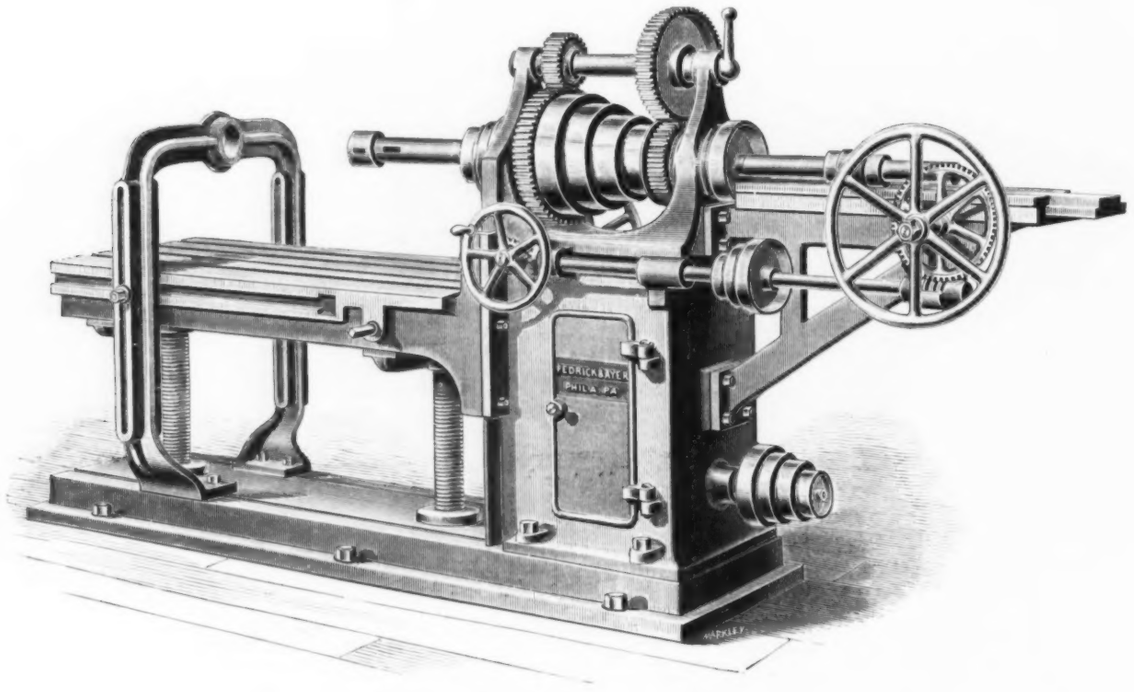


Fig. 2.—Horizontal Boring and Drilling Machine.

Universal Index Head.

This index head, Fig. 3, is intended for spiral milling, dividing, &c. It is made heavy and strong, so that quite large work can be done with it. It is graduated on the edge and will raise any angle from in line with platen to a vertical position and register same. The worm wheel has 40 teeth, cut three per inch, with an adjustment for wear and protected from chips and dirt; two dial plates are furnished, 8⅝ inches diameter, allowing a greater number of holes to make the divisions and making them very plain. A sector, nicely fitted, when set properly, avoids all counting and makes mistakes less liable. The crank that carries the index pin is long, giving good bearing for it. The hub of same is so arranged that the pin enters the dividing holes exactly the same under all conditions. When set in a horizontal position it will take a piece 12 inches diameter. A tail center or back bearing is furnished that has an adjusting center of sufficient throw for taper work and for all adjustments necessary; 11 gears with bearings and fixtures accompany it.

Vertical Index Head.

This device, Fig. 4, is intended for cutting large gears and other dividing. It consists of a heavy based tongue to fit the T slots of milling machine platen, carrying a vertical spindle, with taper hole for arbors to support the work. At the base is an 80 tooth worm-wheel and worm for dividing. Each head is furnished with spacer, two drilled index plates, slotted crank and a support to set under the rim of the gear to resist the cutting. This head is very valuable for cutting gears or work over 20 inches in diameter. When in operation the vertical feed is used, the support being placed under the rim and nearly over the center of the knee. Both these heads are made by Pedrick & Ayer.

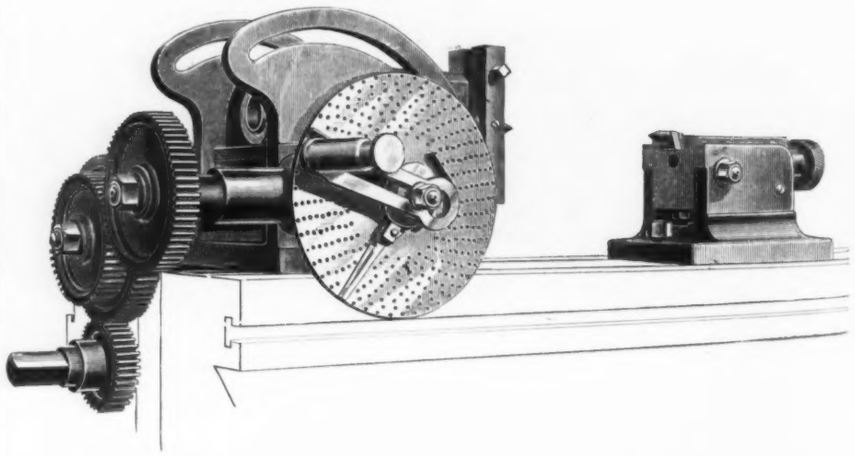


Fig. 3.—Universal Index Head for Milling Machine.

Exporters of petroleum who are making enormous shipments from this country to anticipate a proposed import tax in France to take effect on the 1st prox., have secured for this purpose all the available tonnage at Philadelphia and neighboring ports.

THE WEEK.

A convention of cotton growers has been called for January in Memphis, to perfect the plans of the National Farmers' Alliance in controlling the cotton crop hereafter. The cotton growing States are to be divided into sections, the needs of the planters in moving the crop ascertained, and cash advanced to the extent of 50 per cent. of the crop's value. The projectors claim that they have secured the co-operation of wealthy English and German spinners, who will furnish the money and take the crop. The scheme is regarded in New York as visionary.

The proposal to manufacture gas on a large scale in Long Island City for the supply of gas companies in New York by means of a tunnel under the East River at Blackwell's Island, is being gradually carried into execution, although the plan may not be perfected for several years. The tunnel will be 12 feet wide by 8 feet in hight, through solid rock, and shafts have

already been sunk on either side of the river.

The number of Canadians in the United States, according to the census of 1890, was 980,941, as compared with 717,157 in 1880, an increase of 263,784, or about 37 per cent. The number of Canadians in the New England States in 1890 was 380,167, as against 175,426 in 1880, showing that in ten years the number has considerably more than doubled.

Canada is trying to promote trade with Bermuda, but the Finance Minister of the Dominion points out that it would be impossible for the Government to make reductions in tariff which would be applicable to Bermuda alone. The published statistics show that nearly all the trade of the island is absorbed by the United States.

A 2000-ton steel yacht is building at Laird's in Birkenhead for W. K. Vanderbilt, to replace the "Alva." Will he be able to sail her under the American flag?

The interest of the Street in the International Monetary Conference is increasing rapidly now that the English delegates have taken an active part in the proceedings. The general expression is that Mr. Rothschild's proposition that the European governments shall agree to buy £5,000,000 of silver annually is wholly impracticable.

The Government of Paraguay offers large concessions, including prizes ranging as high as $5000 to $10,000, to attract agriculturists who will cultivate tobacco, sugar, coffee, rice, bananas, ramie, &c.

Annexation to the United States is warmly discussed in Canada, drawing many public meetings, but the idea is scouted by London papers.

Mayor-elect Gilroy will advocate the erection of a new City Hall on the plea that the city at the present time is paying $160,000 a year in rents, which would pay the interest on $5,000,000 of bonds, so that it would be economy to get a new building as soon as possible.

It is announced that James Knott of Newcastle-on-Tyne, England, who is largely interested in the Prince line of ocean steamships, has decided to establish a regular line between Charleston and Mediterranean ports, also that the Chesapeake & Ohio Steamship Company have been formed at Baltimore to operate a line of six steamers between that port and Liverpool.

A thoroughly equipped terminal station, to cost upward of $100,000, will be built at St. George, Staten Island, for the Baltimore & Ohio Railroad, also two large freight warehouses and four ocean steamship piers. Other improvements will be made on the island, including a shipyard at Clifton; the whole requiring an expenditure of at least $1,000,000.

The locomotive engineers representing the Vanderbilt lines between New York, Buffalo and Pittsburgh are seeking to obtain from the management better pay. General Secretary Estes of the New York Central Railroad ridicules the idea that they are intending to strike during the World's Fair, and says that they are working under an agreement which holds until 1895.

The Park Commissioners propose to contract for a statue of John Ericsson, the deceased inventor of "Monitor" fame, for $10,000.

Florida orange growers report only about 3,000,000 boxes in sight, which is a reduction of 750,000 compared with last year, when they realized not much more than a dollar a box. Any deficiency will be made good by the increased yield in California.

The Great Northern Pacific Railroad is now running trains from Spokane to the Columbia River, 1653 miles from St. Paul, and will probably complete its track to Puget Sound early this month. Both in Washington and northern Minnesota the road is opening new regions, some of which are not yet settled.

The use of steam on the canals seems to be more in favor every year. Ten new steamers for the Erie Canal were built during the past season, and many more will be ready by the reopening of navigation. Nothing is heard about the work injuring the banks, as there have been fewer breaks than usual. The season was more profitable than that of 1891.

The New York Power Company, chartered by the Board of Aldermen last week, were designed to be successors to the National Steam Heating Company, and were granted a franchise which enables them to tear up pavements in laying their mains. Besides, a payment to the city for each lineal foot of the mains laid and 2 per cent. of the annual net profits, the grant was without consideration. Mayor Grant is expected to veto the scheme.

It is said that the United States & Brazil Mail Steamship Company have maintained their line between New York and South American ports at a net cost of $1,000,000 during the last ten years, but are inclined to persevere, believing that eventually North America will get the larger part of the trade now done in Europe. The Postal Subsidy bill is welcome, but the president of the line is quoted as saying that the compensation received for mail transportation will not equal the cost of maintaining the required 14 knots an hour.

The Superintendent of Foreign Mails in his annual report gives considerable space to an account of the establishment of the new contract ocean mail service. The following lines are in operation: New York to Laguayra, New York to Colon, San Francisco to Panama and San Francisco to Hong Kong. The Department has paid for the assured regularity and increased speed of this service from its commencement in February last to June 30, in excess of the amount which would have been paid for the same service at the allowance of the full sea and United States inland postage, as follows:

New York to Laguayra	$23,043.04
New York to Colon	12,383.72
San Francisco to Panama	38,061.15
San Francisco to Kong Kong	3,615.94
Total	$77,103.85

The compensation for this service is based on certain rates per mile; six additional contracts have been entered into for this service. The lines from New York to Antwerp and from New York to Buenos Ayres are practically new, but the benefits of the new Postal Subsidy law are as yet mainly prospective, depending in large measure upon the action that may be taken in transferring the flag of the Inman line steamers and constructing new tonnage in American yards.

The course of events at the Brussels Monetary Conference points more clearly to the necessity for repealing the Sherman Silver act at the earliest opportunity, as the only alternative. Henry W. Cannon of the American delegation, who most truly represents the business interests of the country in that body, cables from Brussels that if the conference fails the United States should go out of the market as a purchaser of silver for currency purposes until an international agreement as to the value of gold and silver is made, and should take steps to increase and maintain its stock of gold. The conference will not have been useless if it serves to demonstrate the absurdity of any combination, even though it be of international proportions, attempting to bolster the value of any commodity at a point higher than that fixed by the laws of trade.

The Detroit Chamber of Commerce is discussing plans for a new building to be constructed of steel, at a cost of about $400,000. The secretary of the Philadelphia Bourse says their new building will cost $2,250,000.

The fine harbor of Newport News is at length to be utilized as a terminal point for a line of steamers sailing to Liverpool under the auspices of the Chesapeake & Ohio Railway Company.

American colonists who have gone to Honduras to grow coffee sometimes meet with disagreeable vicissitudes. A Cleveland paper gives an account of two Americans from that city who had an altercation with the owner of mahogany timber lands, on which they were regarded as trespassers, and in the end both were hacked to pieces with machetes.

Three acres of land over the Honey Brook Mine at Hazleton, Pa., where a fire has been raging for several days, caved in last week. The mine is one of the best in the coal regions.

President Diaz of Mexico was inaugurated December 1 for the fourth time, with great pomp. The country appears to be in all respects flourishing. One of the latest internal improvements is a proposed railroad from the capitol of the republic running almost directly southward through the heart of the most fertile region. The fine city of Oaxaca, too, is being intersected by railways in almost every direction.

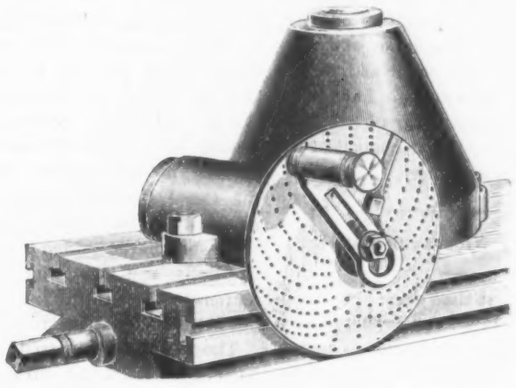


Fig 4.—Vertical Index Head.

The Iron Age

New York, Thursday, December 8, 1892.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - - EDITOR.
GEO. W COPE, - - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - - HARDWARE EDITOR.
JOHN S. KING, - - - - BUSINESS MANAGER.

The Decline in Cost of Production.

No statement is more frequently heard in times of low prices like these than that product is being marketed below cost of production. It is a statement so frequently reiterated by sellers, who still go on meeting a further drop, that buyers have become very skeptical and pay very little attention to such arguments. It may be admitted that there are times when a manufacturer will sell at a loss. He may do it to keep his organization together, or to retain a real or fancied hold upon his trade. It does happen, too, that sometimes sales must be made to procure funds to meet maturing obligations, or that goods are slaughtered because it is the best way out of unfortunate purchases of raw material. It is true also that a certain price is below the cost of a poorly located, antiquated or inefficiently managed plant. But all these special circumstances put together will not account for more than a fraction of the number of cases in which a plea of selling below cost is urged as an argument to effect sales, or in which the assertion that rivals are ruining themselves in this particular way is made in order to give the buyer some confidence in values.

In the staple products at least consumers try to obtain as close an estimate of the capacity to produce cheaply as they can, and generally they are too high because their figures are not the latest obtainable. They observe how producers go on selling close to or below the limits which are dangerous according to the data which are in their possession and yet seem to prosper, with enough confidence in the future to extend and improve their plants.

We believe on the whole that those who are active in the commercial side of manufacturing enterprises fail to take into account that the technical management is slowly but steadily cutting down the elements of cost, and that every achievement thus attained is a permanent gain. An increase in the product from a given part of the plant reduces labor cost and general expenses, a lowering in the fuel account per unit of production is never lost, a reduction in the waste or its utilization is a permanent gain. Materials in course of manufacture are handled more efficiently, selling expenses are lowered and quality is improved. All these gains are cumulative and are permanent. Singly and for short periods they do not make an imposing show, but we venture to say that no manufacturer who has behind him the record of 10 or 15 years' achievements will fail to be surprised at the effect of these economies in a cost sheet of 1891 as compared with a similar document dating say 1880. Let him figure out how many tons of fuel it took him per unit of product, how many days of common and of skilled labor, what his percentage of waste and of rejected or second-grade product was. Let him study the question how much his unit of machinery turned out then and now. We venture to say that there will be found few lines of manufacturing in this country in which some wonderful gains have not been achieved.

A retrospect of this character, in its startling results, will serve to emphasize the fact, which is only too often lost sight of, that in a progressive industry cost is being whittled down incessantly. There may be temporary advances in the unit price of labor or of raw materials, but the quantity is being lessened steadily and permanently, and is incessantly crowding down cost. The days of a plant, and for that matter of a whole branch of industry, are numbered when this quiet and slow progress is arrested and small and permanent improvements cease to have their effect upon the elements which go to making up that most precious document of the manufacturer—his cost sheet.

Pushing the Nicaragua Canal.

Now, for the first time since the inception of the enterprise, the proposed ship canal through Nicaragua begins to assume the dignity and importance of a national undertaking. The scheme has received the enthusiastic indorsement of the convention held in New Orleans last week, a body of men representing adequately all parts of the country and its varied interests, and the measures devised by them for its furtherance will shortly come before Congress for final action. Men of acknowledged ability in the world of commerce and finance who have made the subject a specialty affirm that the canal must be built; that examination has shown its practicability; commerce needs it; statesmanship demands it; and this view is shared alike by President Harrison and the President-elect. Mr. Cleveland has said: "The importance of the construction of the Nicaragua Ship Canal as a means of promoting commerce between our respective States and with foreign countries, and also as a contribution by Americans to the enterprises which advance the interests of general civilization, should commend the project to Government approval and indorsement." The purposes to be accomplished were stated very effectively the other day by Judge J. B. Jones of Arkansas, in addressing the convention at New Orleans, when he said: "The Nicaragua Canal will give us the advantage of Europe in the Oriental markets, and, in addition, will give us Australia, the islands of the Pacific, the western coast of South America and Central America. The canal will bring to us the markets of 900,000,000 of people. It will double our commerce between the Eastern, Gulf and Pacific coasts. It will place the wheat grown on our Pacific coast 10,000 miles nearer to Liverpool. It will place San Francisco 10,000 miles nearer to New York. No problem can be conceived of that will so uniformly help all sections of this country. It will stimulate shipbuilding on both the Atlantic and Pacific coasts. The vast markets to be opened will stimulate manufacture in all sections of the country. It will open new markets for our cotton in Oriental and other countries. The bulk of our cotton will no longer be carried to England to be manufactured and distributed to the world from there. London and Liverpool will no longer fix the price of our cotton. It will open markets on the Pacific Coast for our coal, iron and hard woods." Reference was also made to the import of the Clayton-Bulwer treaty of 1850, which provides that neither the United States nor Great Britain should obtain for itself exclusive control of the canal, and that neither would occupy, colonize or assume to exercise dominion over Nicaragua or any port of Central America; that in case of war between the United States and Great Britain the canal should be neutral ground. The concession procured from Nicaragua by the Canal Company further secures the neutrality of the canal, and provides that there shall never be any discrimination in the tolls, and that the vessels of all nations shall pass through the canal without preference of persons or nationality.

The convention passed resolutions in harmony with a bill already pending in Congress, providing that capital stock may be issued to the amount of $100,000,000, which shall be guaranteed by the United States, the bonds to bear interest at the rate of 3 per cent. Seventy million dollars' worth of these shares will be held as security for any obligations the Government may assume under its guarantee, and the Secretary of the Treasury will have the privilege of voting on the stock. In pursuance of this plan there is no possibility that the bonds could fall into private hands, and from thence be transferred to the control of a foreign power. The Government assumes no risks and at the same time holds a position protecting the people of the United States against mischievous combinations or fraudulent speculations. The Canal Company own the concessions from the Government of Nicaragua and have spent thus far about $6,000,000. It now seems reasonable to expect that Congress will take such action that the work will soon be pushed forward with vigor to a successful completion. The great Northwest as well as the East and the South is enlisted in its favor, confident in the belief that the current of trade not only to the Pacific Coast, but to the Orient beyond, will eventually be diverted from old circuitous routes to a new channel in tremendous volume. Ship canals are coming more in favor the world over, the vicissitudes at Panama seeming to have no discouraging effect.

Lake Ore Shipments.

The statistics of Lake Superior iron ore shipments for the season just closing, as presented by the Cleveland *Iron Trade Review*, are very interesting. These statistics show that shipments by lake up to the 1st inst. have exceeded those of 1891 by 2,040,770 gross tons and those of 1890, the "great year" in the ore trade, by 422,143 tons. In the comparison of shipping ports Escanaba looms up with nearly half the total to its credit, while Ashland comes second, Two Harbors third and Marquette fourth. Shipments from Two Harbors have steadily increased in the past three years, while those from Marquette have as steadily decreased, although not quite so heavily in 1892 as they did in 1891. Gladstone maintains a modest position in the list, and Superior appears for the first time this year as a shipping port, some of the new Mesaba range ore having been forwarded through it. The following table shows the course of lake shipments in the past three years :

LAKE SHIPMENTS OF IRON ORE, GROSS TONS.

	1892.	1891.	1890.
Escanaba	4,000,000	3,058,590	3,714,662
Ashland	2,227,407	1,261,658	2,123,856
Two Harbors	1,155,490	890,299	826,063
Marquette	993,113	1,056,027	1,307,395
Gladstone	105,000	177,866	91,091
Superior	4,200	.....	.....
Total by lake	8,485,210	6,444,440	8,063,067

A few cargoes may be shipped in addition to those reported, but the season has now practically closed for lake navigation and the above figures are substantially correct. Some ore is always shipped by rail, however, the very large quantity of 940,634 tons having been thus forwarded in 1890, mainly after navigation closed, while 650,541 tons are credited to 1891 on the same account. The rail shipments this year only need to reach 518,491 tons to equal the great output of 1890. The lake shipments for the past season to Lake Erie ports aggregated 6,660,734 tons, and to Lake Michigan ports 1,824,486 tons. The ore on dock at Lake Erie ports on the 1st of December was 4,149,451 tons, against 3,508,489 tons on December 1, 1891, and 2,893,487 tons on December 1, 1890. The quantity on dock at the close of the shipping season this year is considerably in excess of any previous year, and furnacemen as well as ore miners are interested in the question as to how much of it is sold to go forward for consumption. The *Review* is of the opinion that there is more unsold ore on the docks than in 1891 or 1890. Taking into consideration the stocks held at lake ports on the 1st of May last, and comparing them with previous years, it is found that shipments to furnaces from Lake Erie docks the past season were the largest on record, surpassing 1891 by some 200,000 tons, and 1890 by over 125,000 tons.

Although these statistics have to some extent been foreshadowed by our Cleveland reports as well as by the activity among blast furnaces smelting Lake Superior ores, nevertheless their magnitude excites surprise. It will be remembered that the "great year," 1890, was one of such overdone operation in ore mining and shipping that the impression generally prevailed in iron circles that several years would elapse before the record then made would be equaled. Here it is shown that in only two years, with no forcing of shipments, but with some large mines known to have been restricting their operations, the Lake Superior region has caught up to its former record, if, indeed, it has not done better, as may be shown when the full figures for the year are published. If this can be done in a year with so doubtful an outlook as was visible last spring, what is the region capable of doing with a demand for every pound of ore that can be shipped ?

The utterances of a majority of the journals on the career of Jay Gould have been a disappointment to many who hold possibly old-fashioned views on financial and commercial ethics. It is a somewhat discouraging sign that his phenomenal success should have warped the judgment of many on the means to which he habitually resorted. Possibly the fact may have had some influence in shaping newspaper comment that Gould's most dramatic exploits in trickery and most open assaults upon justice were made in the earlier days of his career, and that he became more conservative and more cautious in later years. There has been an inclination to speak of him as a creature of his times, and that his methods were possible only because a considerable section of society sanctioned them. Even if such a plea be accepted as a partial justification, it is unquestionably true that the evil influence of Gould's successful example has been very great. As a manager of corporations, he habitually and deliberately betrayed his trust for private gain. To some extent the abject submission of minority to majority holdings in corporations has had to do with it. Americans are so thoroughly imbued with the conviction that the majority is entitled to rule that they usually accept a complete loss of their interest philosophically if they happen to be with the numerically weaker element.

OBITUARY.

THOMAS B. HEERMANS.

Thomas B. Heermans, long a prominent citizen of Syracuse, N. Y., died there December 1, after a brief illness. He was 63 years of age. He was born at Albany, N. Y., and was educated for a civil engineer at the Rensselaer Polytechnic Institute, Troy. He was employed in the construction of the line of the Syracuse & Utica Railroad, now a part of the New York Central & Hudson River Railroad. He also was one of the engineers who surveyed and had charge of the building of the Syracuse & Oswego Railroad, now included in the Delaware, Lackawanna & Western system. Several years after this he was in business in Syracuse as a member of the hardware firm of Marvin, May & Heermans. Indoor work injured his health and he afterward resumed engineering. For a number of years he was superintendent of the middle division of the New York Central & Hudson River Railroad. He resigned this position in 1868 to again enter upon a business career in Syracuse, from which he retired in 1872.

CORRESPONDENCE.

The Copper Situation.

To the Editor : Apropos of the copper situation. The steady advance of the last two or three weeks foretells a significant prospect. Viewed from an impartial standpoint, the possibilities for a considerable advance in this article have never been greater than that at the present moment. This may fairly be inferred from the fact that copper is now exported to Europe at as high or even higher figures than the metal is sold at in this country. All consumers of copper are well aware that at one time, and not so very long since, it was impossible for the American producers to sell their surplus stock of copper to foreign dealers or consumers except at a lower price—very often as much as 1 cent a pound less—than the home consumer paid. This, however, is no longer the case. Europeans have bid £55. 10/ this week, and £57. has been asked for Lake copper, proving conclusively the upward tendency the market has taken.

One of the most important factors in the consumption of copper is the electric railroad business, which, should the developments expected during the ensuing year materialize, has a brilliant prospect before it, such as will be unprecedented in the history of electric railroad building. As an example of the certainty with which such developments are regarded an eminent Wall street broker recently asserted that, "No bonds can find such ready purchasers as those of prospective electric railroads, backed by prominent capitalists."

Another important feature in the consumption of copper is the construction of telephone and electric-light plants, which are daily coming in greater demand with the go-ahead progress of the times. The demand for copper and the multitudinous uses to which it has been put within the last ten months, are extraordinarily large. As a well-known fact, producers have sold all they can deliver this year, and there is reason to believe that some have actually sold beyond their possibilities of supplying, on timely deliveries at all events. Most consumers have pursued the "hand-to-mouth" policy in their purchases owing to the uncertain prospect heretofore presented in the copper market, consequently their stock on hand of the raw material has never been so light as at the present moment. The natural inference is that within a very short time manufacturers must make their purchases for deliveries early next year, and with the demand that will spring up simultaneously by all the consumers (unless all previous records of buyers' actions are no precedent) the price of copper will undoubtedly be advanced and this can only be attributed to natural causes—supply and demand.

Presuming the consumption of copper in this country should only be as large in 1893 as it was in 1892, where are the consumers to get their Lake copper from ? When it is taken into consideration that in 1892 not only was all the Lake copper consumed which was produced, but besides that there were about 14,000,000 pounds of copper, partly known as the syndicate holdings and partly held by one of the Boston mining companies, a continual menace to both producer and consumer, as at any time when the holders of this syndicate copper thought fit to do so they could force it on the market. This copper, however, has since been disposed of entirely, and has long since gone into consumption, and to-day it can be positively asserted that there is no surplus stock either in the hands of bankers, speculators or mining companies.

Everything in this country certainly looks more prosperous and more promising than for years. The political question

does not interfere with copper, although it does with a good many other articles. The tariff question, which troubles many industries, and which on account of the change in Administration and party in power has occasioned a great deal of anxiety to many sympathizers with the outgoing party, does not at all affect copper. This article, being on solid ground and being exported to Europe, is not influenced at all by any alteration in the tariff. The only question in the metal market which the change in Administration affects in the slightest degree is the silver question, and this is admittedly the only one calculated to cause any anxiety to timid holders. Again, we can see that copper is one of those very few articles which are not affected by any silver legislation. Copper is to day on a gold basis, as it will always be, for the reason that it can always be exported to Europe and exchanged for gold; so that if any trouble should arise with the silver and currency question copper will be the safest thing that anybody in the United States could hold—safer than anything except gold mortgage bonds, because if they want gold for their copper they have but to ship it to Europe and obtain the gold in exchange for same. The brass and copper manufacturers of the United States may, therefore, well be envied by those who are not in this exceptional state, as all their stock in process of manufacture and in the raw material is on this gold basis.

Carefully reviewing, therefore, all the admitted facts above set forth, there is but one conclusion to be arrived at, which is that, with the anticipated large demand for copper, which must come, the natural result will be a steady advance in price.

INCOG.

We print the above as an expression of opinion which is entitled to recognition. The salient fact in the copper industry is that the supply is, for the present, lessened by the stoppage of the plant of the Anaconda Company. But it must not be forgotten that the will of one man who controls it can over night throw the whole weight of its product upon the market. To this extent the situation now is artificial and in that sense unsafe.

EDITOR *The Iron Age.*

The Babcock & Wilcox Company.

To the Editor: We desire to contradict a statement which has appeared in a number of papers, viz.: that "George H. Babcock succeeds Babcock & Wilcox, boiler manufacturers, at Plainfield, as sole proprietor of the concern." The above erroneous statement is due to mistaking the winding up of the old business of the firm of Babcock & Wilcox for the affairs of the Babcock & Wilcox Company, the latter being an incorporated company in which both the above-mentioned gentlemen are stockholders.—Yours very truly,

THE BABCOCK & WILCOX COMPANY,
Per Nat. W. Pratt.
New York, December 2, 1892.

Central Lodge No. 2 of the National Union of Iron and Steel Workers was organized at Pittsburgh on Saturday evening, the 3d inst. This is the second lodge belonging to the above association organized in Pittsburgh, and is composed exclusively of heaters, rollers, catchers and roughers. Six lodges have thus far been organized, and the statement is made that the efforts of the Amalgamated Association to induce the finishers to return to their ranks have been without avail, and the work of building up the National Union of Iron and Steel Workers will be pushed actively.

Mahoning and Shenango Valleys.

The question of classification of the plate mill of Mahoning Valley Iron Company, Youngstown, will probably be settled this week, as the matter has been referred to the Executive Committee of the Amalgamated Association with power to fix the matter up with the company. The committee meet at Youngstown with the company to-day (Wednesday), and it is expected that the men will go to work next week. This trouble has shut down this department since last June.

The Youngstown Bridge Company have just completed the iron stock house for the Girard Iron Company's Furnace, and will at once proceed to build the new iron casting house for the same plant. The Mattie Furnace will be one of the best equipped in the State when the improvements now under way will be completed. The furnace will be capable of producing 200 to 225 tons daily. The product is mostly mill iron of high grade, and is used largely in Pittsburgh rolling mills.

It is reported that the Mary Furnace, at Struthers, which has for some years past been operated under a lease by Pickands, Mather & Co., will be started up soon.

Summers Bros. & Co., Struthers, Ohio, have placed an order for a set of new Adams boilers with the Enterprise Boiler Company, Youngstown, to be built at their rolling mill. Summers Bros. are contemplating an enlargement of their plant next summer. They are running full time and cannot keep up with their orders.

Wm. Tod & Co., Youngstown, are building six new Porter-Hamilton blowing engines and three stationary engines for rolling-mill work; also a number of pumps and small machinery that will occupy their large force of mechanics all winter.

The P. L. Kimberly & Co. rolling mills at Sharon and Greenville are running double turn and are supplied with large orders for bar and plate.

It is evident that there is much dissatisfaction among the members of the Amalgamated Association on account of the steps taken by the finishers to form an association of their own. Indeed, it seems that this dissatisfaction exists among many finishers as well as the puddlers. Many of the lodges of the Amalgamated Association have decided at their meetings not to support the new organization, as they think that the Amalgamated Association can do more to protect their interests than the new finishers' association, because in the first place it is doubtful whether the new movement will ever be able to accomplish its purpose owing to the non-support of the friends of the Amalgamated Association, and, secondly, because they believe it will be better to have one strong organization like the Amalgamated Association to handle their interests than to weaken that association by entering into a separate one. It is said by many of the leading men that a compromise will probably be effected soon and the outcome will be that both organizations will work together harmoniously under the Amalgamated Association. However, the recent move on the part of the finishers will hereafter remind the Amalgamated Association officials that they must guard well the interests of the finishers.

The new Finishers' Union met at Pittsburgh last Saturday evening to discuss matters relating to the trade. It is reported that the new association will yet reunite with the Amalgamated Association. There has been such talk on both sides. Mr. Carey, the president of the Finishers' Union, says: "I wish to correct a statement made in a local paper recently 'that we would work with non-union men or work non-union material.' What I said was that we would make our union so desirable to all men that there would be no non-union men. I also said that we would not interfere with our employers in operating their mills, but I never intended it understood that our union would deviate from the cardinal principles of the Amalgamated Association. We have all been union men, and will continue to be, and if our public remarks are to be distorted in a way that is beyond reason, we are willing to explain to our members, but no amount of bluff or bluster could induce us to enter into a controversy in the public press. For the Amalgamated Association we have the kindliest of feelings, and I am sure they will not wrongly construe anything we may say."

Andrews Bros. Company's 10-inch mill made 79,000 pounds of iron last Thursday on one turn of seven hours. This plant is running full time with large orders ahead.

The Struthers Furnace, at Struthers, Ohio, is being put in readiness to start up. She has been idle for over a year. A number of repairs will have to be made.

The Brown-Bonnell Iron Company are still engaged on the erection of the new departments and will have one of the most complete rolling mills in the United States when these improvements are completed. They already employ 4000 men.

A leading officer in the Amalgamated Association said this week that there has been no general secession of the finishers from the A. A., and that, therefore, the majority of those identified with the Finishers' Union are still members of the A. A. The A. A. have made no overtures to the disaffected men to withdraw from their new allegiance.

A Shenango Valley manufacturer was in Youngstown last week inspecting the Malleable Iron Works property, with a view of leasing or purchasing the same. These works have been idle for several years. They are said to be fully equipped for making the best kind of malleable goods.

Wm. Tod & Co., Youngstown, are erecting a new Hamilton blowing engine for Union Rolling Mill Company, Cleveland. This concern have orders for five other engines now on their books and in course of construction.

Another blast furnace in the Mahoning Valley and three more in the Shenango Valley will be blown in by the first or middle of next month. Iron and steel mills are crowded with large orders, but at very close figures.

The Enterprise Boiler Company of Youngstown have recently supplied almost every mill in the Mahoning Valley with the new Adams boilers, which are said to be giving satisfaction.

The Sharon Iron Company are running their extensive rolling mills in all departments. The blast furnace is also making a large output. This company have the reputation of making very high-grade bar iron.

The Mahoning Valley Iron Company, Youngstown, have, after six months' idleness, started their plate mill again. The Executive Committee of the Amalgamated Association and the crew of the mill and J. H. Nutt, representing the management of the mill, held prolonged sessions Saturday, endeavoring to reach a settlement of the wages of men not covered by the scale. According to the agreement, the roughers are to receive a higher per cent. of wages than are received at any other plate mill, for the reason that there are not the conveniences and modern improvements at the mill that others have. The catchers are reduced 10 per cent. and the heaters' helpers are also reduced 10 per cent. All of the old crew who desire to go back to work are given employment. The puddle furnaces, which were shut down owing to an overproduction, occasioned by the stoppage of the plate mill, will likely be started next week. The adjustment of this matter gives employment to nearly 200 men.

Work is progressing rapidly on the new tin plate mill of the Falcon Iron & Nail Company at Niles, Ohio. The foundations are completed and the framework of the buildings put up. The boilers and machinery will soon be put in place and the works will be ready to start in the early spring. It is one of the best laid out tin works in the country. It will employ about 100 men at the start.

The Joliet Steel Works Club.

The third anniversary of the Steel Works Club of Joliet, Ill., was celebrated on the 3d inst. A special train on the Chicago, Rock Island & Pacific Railroad conveyed the officials of the Illinois Steel Company and a large number of invited guests from Chicago to Joliet to witness the exercises. The club house, as has been previously mentioned in the columns of *The Iron Age*, was erected by the company for the sole use of the employees of the Joliet Steel Works. The club house is a very creditable piece of architecture, specially adapted to its purpose, having a gymnasium, swimming pool, library, bowling alley, billiard room, handball court and a large assembly room for public gatherings. The assembly room is on the top floor of the building, occupying the entire space. In this room the exercises of the 3d inst were held.

The employees of the company, with their wives and children, turned out in large force. A hearty greeting was extended the visitors by F. A. Emmerton, chairman of the board of directors of the club, who introduced W. Crane, superintendent of the club, for the purpose of presenting the third annual report. A striking feature of this report was the fact that not a single infraction of the rules governing the care of the club house had been brought before the board of directors during the past year, showing the excellent spirit manifested by all the members in taking care of their handsome property. The club has 855 members in good standing. The membership would be much larger but for the fact that many of the employees live too far from the club house to be able to regularly enjoy its advantages and privileges. Mr. Crane gave a very interesting statistical *résumé* of the occurrences of the year, showing how the several departments of the club house had been patronized. In all 639 persons received instruction during the year in the club classes, covering shorthand, bookkeeping, drawing, &c., as well as juvenile classes. A co-operative system of purchasing goods of general consumption has been introduced with gratifying results to the members of the club. The expenses of the year's operations were kept within the club income, but Mr. Crane dwelt upon the fact that the club's work was somewhat hampered by the need of a larger income, which could only be brought about by an increased membership, with the additional funds which that would insure.

W. R. Stirling of the Illinois Steel Company, who has taken a special interest in the creation and success of the club, was introduced and made an address on behalf of the trustees. His address was highly eulogistic of the club, the trustees having been called upon to perform very little work in the discharge of their duties, owing to the admirable manner in which the members had taken care of the property. He stated that some improvements were in contemplation, which would be undertaken very shortly. Mr. Stirling urged the further development of the co operative system of buying as leading to greater thrift among the workingmen. A new building will be erected during the coming year in which the sons of members will be instructed in blacksmithing, wood working and metal working.

Mr. Stirling dwelt upon the relations between the Illinois Steel Company and their workmen and challenged any one to name a company which had done more than his company to promote cordial relations between employers and employees and to promote their mutual interests. His remarks were very enthusiastically received, evincing the high regard in which he is held by the Joliet workmen, for whose benefit he has devoted much of his time for many years.

After a pleasing selection had been rendered by the club orchestra, Dr. McClure of Lake Forest University, delivered an address on "Muscular Christianity." Lessons were drawn from the life of Christ with happy reference to the proper performance of daily tasks. Dr. McClure's remarks were wholly unconventional, free from platitudes, and highly appreciated by his auditors. In the absence of Mayor Haley of Joliet, City Attorney J. W. Downey addressed the club in behalf of the city. In eloquent terms he voiced the pride felt by the citizens of Joliet in the benefits realized from the establishment of the Steel Works Club.

After another selection admirably rendered by the orchestra, Dr. Harper of the new Chicago University delivered an address on university extension. He alluded to the fact that a class was to be established under the auspices of the club for university extension in connection with the Chicago University, and urged that deep interest be taken in the matter by the members of the club. He was followed by Wm. Ross, who spoke on behalf of the club members, giving a very practical talk on club work, which was highly enjoyable, not only to his fellow members, but also to the visitors. The closing remarks were made by W. G. Beale of Chicago, as representing the guests present. He complimented the club in glowing terms.

Washington News.

(*From Our Regular Correspondent.*)

WASHINGTON, D. C., December 6, 1892.

The prolonged controversy over the use of high smokestacks on the cruiser (No. 3) "Brooklyn," has been practically determined in favor of the position taken by Engineer in Chief Melville. The following interesting letter to the Secretary of the Navy by Commodore Melville will explain the advantages of the change:

NAVY DEPARTMENT,
BUREAU OF STEAM ENGINEERING,
WASHINGTON, October 14, 1892.

MEMORANDUM FOR THE HONORABLE THE SECRETARY OF THE NAVY.

ADVANTAGES OF THE 100-FOOT SMOKE PIPES OF ARMORED CRUISER NO. 3.

1. It enables a higher average speed to be steadily maintained without any special fittings.

A fair average value of the coal burned per square foot of grate surface per hour with an ordinary 60-foot pipe is 15 pounds.

It has been estimated, as the result of experience and experiment, that each 10 feet of additional hight increase the draft as much as ¼ inch of water-air pressure. Thus the extra 40 feet mean, in round numbers, ½ inch of water-air pressure.

A very conservative estimate of the increased combustion due to ¼ inch air pressure is 10 pounds per square foot. This makes the combustion with natural draft in the 100-foot pipe 25 pounds per square foot.

The effect of this in armored cruiser No. 3 with 1016 square feet of grate surface is to give us in round numbers 11,500 indicated horse-power, instead of 7000 indicated horse-power with the shorter pipe. As the cruising displacement is 9100 tons, this means raising the sustained speed from 15.23 to 17.20 knots, nearly 2 knots per hour.

2. All experience goes to show that the long-continued use of forced draft by pressure in the fire room has a deleterious effect on the boilers. Even as low a pressure as ¼ inch will after a day or two begin to develop leaky tubes.

This is avoided when the same combustion is produced by chimney draft.

3. Hence there is an increased longevity of the boilers when the increased power is secured by a high pipe rather than by forced draft, and a saving in the cost of repairs.

4. There is an actual saving at powers below the natural draft full power of all the boilers due to the following cause:

Whenever a boiler is under steam a certain amount of coal is expended simply in supplying the heat lost by radiation.

Experience with the smaller boilers of other ships leads to the belief that this amount for the large boilers for Armored Cruiser No. 3 would be from 2½ to 3½ tons per day.

This means that where it would take say three boilers to give the desired speed with the short pipe, two would do with the high pipe, making a saving due to laying off this boiler of at least 3 tons per day.

5. The high pipe will also produce an actual economy of combustion due to the more energetic combination of the oxygen of the air with the fuel. This has been shown by repeated experiments with moderate forced draft, to which, as has been seen, the action of the high pipe is equivalent in its good features.

6. There is also the saving of the extra coal needed to run the blowers. Reliable data of the power of blowers at various speeds are scarce, but available data suggest that the power of the eight large blowers of Armored Cruiser No. 3 to give ½ inch air pressure would be between 50 and 75 indicated horse-power.

The simple engines driving these blowers are wasteful, and an allowance of 5 pounds of coal per indicated horse-power is conservative. This means at the lowest figure taken (50 indicated horse-power) 250 pounds of coal extra per hour, or nearly 3 tons a day.

8. The necessary location of the blowers is such that it is impossible wholly to protect the working parts from dust, so that, after steady running for some time, there is so much wear as to necessitate adjustment, or else to involve the risk of a breakdown. Such use, therefore, may prevent the machinery working at full power just when most needed.

It is thus seen that, besides the cost of steadily running the blowers in coal, there is the added cost of repairs.

8. The high smoke pipe gives us the benefit of an increased combustion due to ½ inch of water-air pressure without requiring a single additional man to look after it, while the use of the blowers will involve all the time of one man in any case, and when all are working, several men.

This, moreover, comes at a time when extra work comes on the coal heavers and firemen, so that, with the ordinary peace complements, all the men are needed without allowing for some to look after the blowers. The subdivision of the coal bunkers makes the work of getting out coal arduous and slow at best, and, unless there is an adequate number there is no use in trying to increase the rate of combustion, as the coal cannot be provided as fast as it can be burned.

9. There is the further advantage that having already raised the steady cruising speed from 15.35 to 17.2 knots, if a small additional increase is wanted, say 1 knot, this can be obtained with a moderate increased air pressure from the blowers. With the short pipe ½ inch pressure would be required, besides the amount needed with the high pipe.

It is thus seen that the high pipe—

Increases the speed without injury to anything.

Increases the life of the boiler.

Increases the economy of combustion at mod erate powers.

Saves coal lost by radiation from extra boilers used with short pipes.

Saves in repairs to boilers.

Saves in repairs to blowers.

Saves extra coal needed to run blowers.

It should, perhaps, have been distinctly stated at the start that this hight of 100 feet is above the lowest grates of the boiler furnaces.

The clear hight above boats and other large objects on the upper deck, which is the hight that appeals to the eye, is only about 45 feet.

Respectfully submitted,
GEO. NELVILLE,
Engineer in chief.

In speaking of the change Commodore Melville says: "This is what we claim upon experience, experiment and deduction. If the change does not produce all the results mentioned the knocking off of a few rivets and lifting off the top will easily reduce the stacks to the hight we are accustomed to seeing. We are willing to test our judgment in favor of the change."

MANUFACTURING

Iron and Steel.

Furnace No. 1 of Shoenberger, Speer & Co., at Pittsburgh, which has been undergoing extensive repairs for some time, resumed operations during the last week in November.

Edith Furnace, in Allegheny, Pa., operated by the Oliver Iron & Steel Company of Pittsburgh, is again in successful blast, after being extensively repaired. The output for November was 5226 tons of No. 1 Bessemer iron.

The usual custom of closing the Homestead Steel Works at Homestead, Pa., at the close of the year for annual repairs will be followed this year, the shut down occurring about the last day of the year. The plant will probably be idle for ten days or two weeks, during which time a number of changes will be made which will considerably increase the capacity. Automatic tables will be placed in the slabbing department which will greatly facilitate the work and do away with the employment of a number of the hands. The report published in the Pittsburgh papers that a new scale of wages would be arranged to go into effect upon resumption of operations is officially denied. The scale of wages submitted to the men by the firm, which went into effect July 1 last, continues in force until December 31, 1894.

The New Castle Steel Casting Company recently received a large order for steel castings for shipment to Elora, Ind. The same firm have recently furnished a large number of steel castings to the Connelly Gas Engine Works of New Castle, Pa.

Suit has been brought in the United States District Court in New York by Carnegie, Phipps & Co., Pittsburgh, Pa., against the former directors of the defunct United States Rolling Company, whose property is now in the hands of a receiver. The suit is brought to recover $17,031.06, the price of goods purchased prior to November 15, 1890, when the United States Court for the Northern District of Illinois appointed Cyrus C. D. Lane receiver for the insolvent company. It is alleged in the affidavit that the indebtedness was incurred at a time when the directors were aware that their firm was insolvent.

Singer, Nimick & Co., Limited, proprietors of the Sheffield Steel Works, at Pittsburgh, took out a permit last week for the erection of a building to cost $5000. It will be put up adjacent to their present plant on the South Side in that city.

The charter of the Rosena Furnace Company was filed for record in New Castle, Pa., on Thursday, December 1. The business of the company is to be transacted in the city of Pittsburgh, where the main offices are located, and the corporation is to exist perpetually. When repairs now being made are completed, it is expected that about 200 men will be employed at this furnace. The new company is composed of Henry W., David B., Jas. B., Jno. C. Oliver and Chas. D. Fraser. The capital stock is $100,000, and each member of the firm holds 20 shares. The Rosena Furnace is owned and controlled by the Oliver Iron & Steel Company of Pittsburgh, but the business will be carried on under the above title.

A. C. Buell, representing Wm. Cramp & Sons of Philadelphia, Pa., who is a frequent visitor in Pittsburgh in connection with the contracts of the Carnegie Steel Company, Limited, for armor plate, was in that city last week. In an interview Mr. Buell is quoted as saying that there was not the slightest foundation for the generally circulated reports that the armor plate contracts of the Carnegie Steel Company, Limited, are to be annulled. He also stated that while the Homestead Steel Works were practically suspended until within a few months ago, the firm is now carrying out their contracts with greater rapidity and efficiency than ever before.

Owing to the large falling off in orders for cotton ties, the Pittsburgh Iron Works of the J. Painter & Sons Company of Pittsburgh have been put on single turn in some departments. The above concern is one of the largest manufacturers of cotton ties in Pittsburgh, nearly their entire output being confined to that class of manufacture.

The Union Drawn Steel Company of Beaver Falls, Pa., are at present making some large additions to their plant.

The Gadsden-Alabama Iron Furnace was sold last week, together with 1400 acres of mineral land, under a decree of the United States Circuit Court. The property was purchased by T. T. Hillman of Birmingham for $110,000. Mr. Hillman represented the first mortgage bondholders, of which he is one of the largest. It is stated that after the sale, arrangements were made to continue the present lease under which the furnace is being operated. Mr. Nixon and associates have been running this plant under lease for some time very successfully.

The reports of Ethan A. Hitchcock, special commissioner in the suit of the Farmers' Loan & Trust Company *vs.* the St. Louis Ore & Steel Company, were last week approved in the United States Circuit Court in St. Louis, by Judge Thayer. They related to the sale of the Vulcan property. The first report covered the sale of the Vulcan Iron Works and appurtenances in Carondelet, 100 shares of stock in the Steel Patents Company, and a limited partnership in the Bessemer Company, purchased by C. C. Maffitt, Pierre Chouteau and James Taussig for $45,000. The second report covered the sale of the Pilot Knob property to R. S. Grant, Solon Humphreys and Le Grand B. Cannon for $15,000. The third report related to the Vulcan property in Illinois, also sold to Grant, Humphreys and Cannon. Owing to contentions as to the proportion of expense of the care and operation and the proper distribution of the remainder between the mortgaged interests, Wm. G. Hammond, one of the Masters in Chancery, was ordered to take testimony. All of the above mentioned property was owned by the St. Louis Ore & Steel Company, and was sold under mortgages held by the complainants.

Franklin Furnace, at Kirkland, N. Y., has been banked.

The Cedar Point blast furnace at Port Henry, N. Y., has been thoroughly repaired under the superintendency of Messrs. Gordon and Doud, and has been blown in.

The entire plant of the Midland Steel Works, at Muncie, Ind., has been started up with a force of 325 men.

A 72 x 30 inch engine recently located at the dismantled furnace of the Ashland Iron Company, at Asbland, Md., is being set up at the Sheridan Furnace, Lebanon, Pa.

The steel works of the Colorado Fuel & Iron Company, at Pueblo, Col., are to be operated to their full capacity for five or six weeks until present contracts are filled. After that a shut down is contemplated, for the purpose of placing the works in better condition. It is stated that the outlay for improvements will reach $100,000.

The Piqua Rolling Mills, at Piqua, Ohio are closed down, in order to change the fuel from natural gas to crude oil.

The Roane Iron Company, Rockwood, Tenn., have authorized the sale of $350,000 bonds, with a view to the erection of new furnaces and coke ovens at Rockwood.

From the Steelton, Pa., *Reporter* of the 3d inst. we take the following: The product of the works of the Pennsylvania Steel Company this week was large and they have pressing orders on hand. The Bessemer made a medium output of rail and some special steels. The open-hearth output was very heavy. No. 1 plant broke all previous records in producing over 3200 tons for the month of November. Every third heat at plants Nos. 2 and 5 was poured for castings, and two batches were poured at No. 1 plant. Furnace No. 5 at No. 3 plant is off on repairs and will be in operation again on Monday. The hammers were on forgings and billets and the product was large. The Universal mill was on slabs and heavy blooms and made an extra good week.

No. 10 stack of the Thomas Iron Company, at Hellertown, Pa., was blown out last week for repairs.

We are advised that arrangements have about been completed by which the creditors of Jas. P. Witherow of Pittsburgh will purchase from Alexander Thomas, assignee of the plant of Mr. Witherow, located at Newcastle, Pa. In order that the details of this plan by which the creditors will purchase the works may be perfected, the assignee's sale of the plant has been postponed until the 15th inst.

The Enterprise Boiler Company of Youngstown, Ohio, recently made a shipment of boilers to the Falcon Iron & Nail Company, Niles, Ohio, which will be put in the new tin plant now being erected by that firm.

Machinery.

The firm of A. J. Sweeney & Co., Wheeling, W. Va., manufacturers of rolling mill machinery, have been incorporated under the laws of that State and will in the future be known as the General Engineering Company. The capital stock of the new concern has been placed at $100,000, with the privilege of increasing to $500,000. The principal office will be located at Harvey, Ill., at which place the firm have under erection a new plant. A branch office will be retained at Wheeling. The shops located on Twelfth street in that city will be operated as usual and their capacity increased to some extent. This is done in order that the firm may take care of their customers located in Wheeling and vicinity, their trade in that city being very large. Jno. M. and Andrew Sweeney will be located at Harvey, Ill., to take care of their interests at that place, while A. J. Sweeney will remain in Wheeling looking after interests of the firm there.

The A. Garrison Foundry Company of Pittsburgh, manufacturers of rolls and rolling mill machinery, have recently erected a new building 100 x 75 feet in size, constructed of iron and brick, which will be used as a machine and erecting shop. It has been fitted up with modern machinery, among which is a 50 ton electric crane.

The Berlin Machine Works of Beloit, Wis., who have hitherto been known as the only manufacturers that have devoted their interests exclusively to the making of Sandpapering Machinery, have just completed their large salesrooms at 56, 58 and 60 South Canal street, Chicago. They are now manufacturing a full line of wood-working machinery, which comprises the latest and most improved devices for the working of wood. They will carry a stock of machines which it is their avowed object to make the largest in the country.

Riehle Bros. Testing Machine Company have recently removed their office and warerooms from 413 Market street to 19 North Sixth street, Philadelphia. This company, at the new store, carry on an extensive contractors' supply business, and have for sale, in addition to their own products, iron, steel and wooden wheelbarrows; iron wheels and casters; hand carts; special trucks; also, the Clark patented rubber wheels and casters.

The Cincinnati Milling Machine Company, Cincinnati, Ohio, are enjoying a large trade, and are doing considerable business in Europe. On the first of this month they shipped four of their Universal cutter and Reamer grinders to England, two to Germany and one to Russia. They have over 50 of these machines scattered throughout Europe.

The Illinois Malleable Iron Company, of Chicago, have added a new foundry to their works on Diversey street and the Northwestern Railroad. The building is of brick, 180 x 80 feet, supplied with a Colliau cupola of 20 tons melting capacity, and will be exclusively used for the manufacture of gray iron castings. The old portion of the plant will be used for malleable castings. The new foundry was occupied on Thanksgiving day for the first time, and the first heat was taken off on the following day. The business of this company has grown rapidly of late, and the addition just made to their works will enable them to employ altogether from 350 to 400 men. They have eight acres of land which it is intended to ultimately fill with foundry buildings. The company handle a great deal of jobbing work in connection with the manufacture of a considerable line of finished products classified as plumbers supplies.

The Allegheny Foundry Co. of Allegheny, Pa., has been granted a charter of incorporation with a capital of $20,000. The incorporators are W. A. Andrews, W. J. Hitchcock, J. R. McCreery, Frank Hitchcock and Alex. Rodgers.

It is reported that the Wheeling and Lake Erie Railroad will remove their general offices, repair shops and round house from Norwald to Massillon, Ohio, if the citizens of the latter place will donate 30 acres of land and $20,000 to the company.

At a meeting of the Board of Directors of the Westinghouse Electric & Mfg Company, held in Pittsburgh last week, the regular semi-annual dividend of 3½ per cent. on the preferred stock was declared, payable on January 3 next.

H. L. Beach maker of wood-working machinery, Montrose, Pa., has added a Bowsher balancing way to the equipment of his machine shop.

A large force of hands resumed work on the new East Tennessee railroad shops at Knoxville, Tenn., last week; the buildings were completed two months ago and the finishing touches are now being put on. The machinery from the old shops will be put in and a large amount of new machinery. This will be the largest plant of the kind in the South.

The amalgamation is announced of the Atlantic Works and the H. S. Robinson Boiler Works of East Boston, Mass.

The Atlantic Works occupy the large brick structure at the corner of Border and Maverick streets, and the Robinson Boiler Works were situated on Border street, near Cunningham & Banks' lumber wharf, but their building and plant were destroyed in the recent disastrous fire which visited that locality.

The old Rawson machine shop at Hornellsville, N. Y., has become the Hornell Iron Works, and all kinds of job castings are done in iron and brass. Wallace & Harman are proprietors.

A manufacturing concern that is to make hooks and eyes of a new design, which will be pinned on garments instead of sewed, are ne-

gotiating for a part of the plant of Frost & Co., machinists, Niagara Falls, N. Y.

It is about eight months since fire destroyed the machine shop of Fregurtha, Hoyt & Co., at Walton, N. Y. The foundry only was saved. A new building has been erected 90 x 32 feet, one-story high, well lighted and ventilated, heated by steam and lighted by electricity. A new boiler house has been put up. The company are at work on several large contracts.

The latest concern to adopt the Ridgway Steam Hydraulic System of Cranes is the Illinois Steel Company of Chicago. The first order recently placed is to be used at their blast furnaces for handling cinder. The cranes both lift and rotate by power.

The Sandford, Florida, Foundry & Machine Works having been dissolved, the machine shop plant will be moved to the building corner of Myrtle avenue and Second street, Sandford, Fla., where the business will be conducted by Rixford & Robbins.

The new plant of the Monitor Iron Works has been put in operation at Newark, N. J. It occupies 7 acres of land and comprises eight buildings. The company were established 25 years ago at Elizabethport, N. J., and later built works at Sing Sing, N. Y. It is understood that for the present the Newark works will be operated as a branch in the manufacture of plumbers' supplies.

W. R. Pollock & Co., of the Mahoning Boiler Works, Youngstown, Ohio, have recently made large shipments of boilers to Seattle, Wash., and Chattanooga, Tenn. This is the oldest boiler concern in the Mahoning Valley, and their business has grown very rapidly within the last few years.

The Neracher & Hill Sprinkler Company of Warren, Ohio, have sold their plant, patents and good-will to the General Fire Extinguisher Company of New York City, which has been incorporated with a capital of $2,000,000. The purpose of the new company is the manufacture, purchase and sale of automatic sprinklers and all other fire protection apparatus and appliances, including steam fire pumps, water hose, engines, hose reels, &c. The directors are O. C. Barber of Akron, Ohio; Edward O. Richards of New York; Frederick Grinnell of Providence, R. I.; George P. Johnson of New York; G. Gunby Jordon of Columbus, Ga.; William Neracher of Cleveland, Ohio; Charles Baird of Akron, Ohio; and Frank Maynard of Providence, R. I. Frederick Grinnell is president of the Providence Steam & Gas Pipe Company, controlling the Grinnell sprinkler. O. C. Barber is president of the present Neracher & Hill Sprinkler Company, controlling the Neracher, Hill & Clapp sprinklers, and is also president of the Diamond Match Company and other large concerns well known in the West. E. O. Richards is the New York representative of the Grinnell sprinkler; G. Gunby Jordon is president, of the First National Bank of Columbus, Ga., and is largely interested in railroad and other stocks. William Neracher is general manager of the Neracher & Hill Sprinkler Company and Charles Baird is its attorney. F. H. Maynard is treasurer of the Providence Steam & Gas Pipe Company and George P. Johnson is treasurer of the Diamond Match Company. The election of officers of the new company will take place December 11 in New York City. The sprinklers controlled by the new corporation will be the Neracher, Hill, Clapp, Grinnell and Kane. The object of the new organization is to reduce the price of manufacture and the betterment of sprinkler installations.

Miscellaneous.

The Groton Bridge & Mfg. Company of Groton, N. Y., have been awarded the contract for the superstructure of a lift bridge over the Oswego Canal at North Salina street, Syracuse. Their bid was $7539.

The Bridgeport Smelting Company of Bridgeport, Ohio, have been granted a charter, with a capital of $20,000, for the purpose of engaging in the manufacture of castings, ingots and other shapes and forms of bronze, brass, &c. The incorporators are John A. Topping, B. M. Caldwell, F. W. Thayer, W. T. Graham and Thos. Mears.

The United States Lock Company, capital $600,000, has been incorporated at Newport, Ky., by Charles Zimmer, L. R. Luebbert and others.

The president of the Cahaba Coal Mining Company of Blocton, Tenn., went to New York last week to finally ratify the trade with the Tennessee Coal, Iron & Railway Company by which the Cahaba properties will be consolidated with the Tennessee Company.

The Cahill Iron Works, Chattanooga, Tenn., are full of orders in all departments. The demand for structural Iron is especially good, and their electro-plating department is very busy. They are building an addition to their works to increase their capacity.

TRADE REPORT.

On the whole, the situation in the Iron and Steel trades is not encouraging so far as the immediate future is concerned. Raw materials are easier and finished products are selling in quite a number of lines at the lowest prices on record.

Foundry and Forge Pig Iron is steady in all the leading markets, but the volume of business is relatively so small that the market has not been well tested. There is a feeling of some uneasiness among sellers, and the best that is hoped for in the near future is that prices do not decline.

Bessemer Pig has eased off both in Pittsburgh and in eastern Pennsylvania, moderate sales having been made at lower prices.

Billets are unsettled and weak East and West. Actual transactions have not been large, principally because buyers take a pretty radical view of the situation, which the recent actions of sellers appear to justify. One strong argument against unduly low prices is the fact that the Edgar Thomson mill has ceased rolling Steel Billets and has gone back to Rails. One point should not be forgotten also, that the low price of Billets restricts the number of sellers and materially increases the consumption.

The Steel Rail market drags along, no orders having come into the market, for the Eastern mills at least, for some time past, nor are there any in sight just yet.

Chicago reports a number of orders for Structural Material and for Bars for car builders, and it seems to be the most favored market for the present.

The East is looking forward to book a good deal of business before the close of the year. The Cramps are reported by our Philadelphia correspondent to be in the market for 20,000 tons of Plates. Next week, too, a battleship and a cruiser are to be given out at Washington, which would call for about 3000 tons of Hull Plates, 600 tons of Boiler Plate, a round quanity of Deck Plates and of Armor and some Shapes. In New York the elevated and bridge work of the Harlem road will come up, and there are also some contracts for buildings.

In the Bar, Nail, Wire and Barb Wire trades some exceptionally low figures are being made in some sections of the country, the current demand being qutite light.

Copper is quiet but firm. Tin has declined slightly, but as yet the artificial position in which the metal lies has not been modified. Lead and Spelter drag along at their low level.

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.
PHILADELPHIA, Pa., December 6, 1892.

The market has relapsed into a condition of extreme dullness, and for the next two or three weeks we expect having to continue reports of this character. Prices are very low and are not likely under any circumstances to go very much lower, but in the absence of anything likely to cause a movement in the other direction, buyers appear to be utterly indifferent in regard to new engagements. Whether this will result in lower prices or not remains to be seen, although there is no doubt that two or three weeks of light sales will cause a feeling of depression, which will necessarily have some influence upon values. So far, however, sellers appear to be in no haste to force matters, and, as stocks are not large, it is just possible that buyers may after all have to make the first movement. This applies specially to Pig Iron, however, as there is an undoubted weakness in Finished Material, especially in Muck Bars and Billets, and to some extent in Plates and in Merchant Bars. There is a considerable business in sight of one kind or another, and there is a fair amount in hand for this year's delivery, but beyond that everything is at sixes and sevens, and as it is difficult to say how much will come in time to start up with January, it is impossible to say what turn prices will take. From present appearances it is inferred that there will be little or no change in Pig Iron, but in Finished Material the feeling is less hopeful, and the chances are that before business gets well under way lower quotations will have to be made. As we said before, there is a great deal of business in sight, but to steady the market something will have to come pretty soon, and in large volume too, otherwise prices will soon get to where they were six or eight months ago. This impression is based on the fact of the very large output which is now in progress, and which could be still further increased after the holidays. The supply is sure to be large, the demand for the present is an unknown quantity, and until some definite knowledge can be obtained in regard to that point prices will continue as they are—weak and unsettled.

Pig Iron.—The volume of business is not large, but prices are steady and the general appearance of the market is not discouraging. For the time being the supply is not excessive, so that holders of good brands have no difficulty in placing all they need at full quoted rates, or very close thereto. There has not been much demand for next year's deliveries, so that the question of prices is still somewhat unsettled and will probably remain so until it is known what the rates of freight are likely to be from Southern points. It will be seen, therefore, that while buyers are in no hurry to make engagements for next year's deliveries, sellers have also good reasons for moving cautiously, as the rates now in force are good only to the end of the month. Some advance is expected, but to what extent no one can tell until the new schedule is completed. Southern companies, however, are not offering Iron except for this month's deliveries, so that in the absence of supply (or demand) prices are nominally the same as during November. It cannot be said that they are lower; they are certainly not higher, but the market is so extremely quiet that there is practically no business doing. Ores are very low, and in that respect makers will have some advantage, but, after all, it is the demand for Iron that will make the price. Some people who have had long experience in the trade take a very hopeful view of the situation, but it is difficult to find any good grounds for expect-

ing better prices; the most that can be hoped is that they may not decline. General business is good and consumption has been very large during the past three months, but the holiday season is near, and for at least one week work will be practically suspended at rolling mills, foundries, &c., so that whatever the ultimate outcome may be, the prospect for the immediate future is not favorable to the selling interest. Business will doubtless pick up after the turn of the year, but whether it will be to an extent sufficient to sustain prices or to stiffen prices remains to be seen. Meanwhile prices are quoted about as follows for seaboard deliveries, and 25¢ @ 40¢ less for Southern brands delivered at points 50 to 100 miles south or west:

American Scotch, No. 1x	$17.00	@	$17.50
American Scotch, No. 2x	16.00	@	16.50
Standard Penna. (Lake Ore), No. 1x	15.25	@	15.75
Standard Penna. (Lake Ore), No. 2x	14.50	@	14.75
Standard Penna. (Lake Ore), No. 2 plain	13.50	@	13.75
Medium Quality, No. 1x	14.50	@	14.75
Medium Quality, No. 2x	14.00	@	14.25
Standard Virginia, No. 1x	14.75	@	15.00
Standard Virginia, No. 2x	14.00	@	14.50
Virginia and Southern, No. 1x. Soft		@	14.50
Virginia and Southern, No. 2x. Soft		@	13.75
Standard Penna. and Virginia Forge	13.25	@	13.50
Ordinary Forge	12.75	@	13.00

Bessemer and Low-Phosphorus Pig—Market extremely quiet, and prices hardly as firm as they were a week ago. Nominal quotations are from $15.75 to $16 at furnace, and $17.75 to $18, with sales of small lots at these figures.

Steel Billets.—From extreme scarcity the market has changed to extreme plenty, and the difficulty is not to get Billets, but to get a place to put them. Those who a week or two ago could barely get carload lots as a favor are now having them thrust on them, which is not conducive to steadiness in prices. As a matter of fact, there is no really new business to be had at the moment. Deliveries are being made with so much urgency that consumers are just laying back, waiting to see what it all means. There are inquiries in plenty, but bids are few and at prices much below what seemed probable a week or two ago, although, of course, something more than bids are necessary to make a market. Nevertheless makers are evidently inclined to encourage business on some terms, and it is not unlikely that the close of 1892 will see prices at about as low figures as at any time during this year of unprecedentedly low figures. The only recent sale of Soft Steel reported around here is one of several thousand tons at a fraction over $25, delivered, but to-day that figure could be shaded, liberally shaded, perhaps, if a direct offer was made, but as we said before, buyers have not made up their minds yet what figure is low enough to keep them in a safe position. Asking prices, therefore, may be given as $24.75 @ $25 for ordinary Soft Steel for January and February delivery at Schuylkill Valley or equivalent points, and about $24.25 @ $24 50 for Susquehanna points.

Steel Rails.—The market is very dull in the East, and while there is considerable business talked about from the extreme West, it is not thought that matters are in shape to warrant the mills in accepting some of the large orders. A good deal depends on what financial arrangements can be made, however, but at present the proposals are not considered altogether satisfactory.

Muck Bars.—The market is extremely dull, and with liberal supplies prices are very weak. Holders talk $24.75 @ $25, delivered, for good quality Bars, but offers to sell at $24.50 failed to bring business, as consumers are not inclined to do anything until toward or after the holidays.

Bars.—Market very dull, and while prices are fairly steady for best quality Bars, there is a great deal of stuff offered at very unusual figures. It is not likely that there will be much improvement until after the holidays, and until then manufacturers have about made up their minds to a mere hand-to-mouth business, at such prices as the market will permit, say 1.70¢ @ 1.75¢ for city deliveries, 1.60¢ @ 1.65¢ at interior points, with the usual rebate on carload lots and upward.

Skelp.—There is the usual run of small orders with an occasional one of 300 to 500 tons, but there is nothing to indicate any special change in the situation. Prices 1.60¢ @ 1.62½¢ delivered, for Grooved, large lots at the inside figure.

Plates.—Business in this department keeps up very fairly, and some of the leading mills manage to run to their full capacity, although in other instances work is getting slack, because of delay in specifying on lots already under contract. The immediate outlook is not particularly encouraging, and it is quite likely that a period of inactivity will be met with during the next couple of months, as current business is being rapidly wound up. There is a large amount of local work to come on the market before long, but it is not in shape yet, and there is no absolute certainty when it will be, although it is intimated from what ought to be authoritative sources that it is much nearer than is generally supposed. We refer to the orders for the new ocean flyers and the elevated railway, both of which, it is said, will be calling for material within 60 or 90 days. Since writing the above we learn that the Cramp Shipbuilding Company will be in the market for 20,000 tons of Plates within ten days' time, and that orders for at least half that quantity will be positively given out before the end of the month Meanwhile prices are weak and irregular, the usual asking rates being about as follows:

	Iron.	Steel.
Tank Plates	1.85 @ 1.90¢	1.85 @ 1.95¢
Shell		2.20 @ 2.30¢
Flange	2.70 @ 2.90¢	2.50 @ 2.60¢
Fire Box	3.00 @ 4.00¢	2.70 @ 2.80¢
Special qualities		3.25 @ 3.75¢

Structural Material. — Business has been very quiet during the past week or two, but there is a great deal of work in hand, so that mills are enabled to run pretty full time. There is some inquiry for new work, and it is expected that large orders will be forthcoming before the close of the year, including a considerable amount from the ship yards. Prices are unsettled, however, and on orders desirable as to specifications and deliveries, it is not difficult to secure special rates, although general asking prices are about as follows: Angles or Sheared Plates, 1.85¢ @ 1.95¢, delivered; Universals, 1.90¢ @ 2¢, and Beams, Channels or Tees, 2.15¢ @ 2.25¢.

Sheets.—There is a good demand for Light Sheets, but not much doing in the low numbers, which are relatively weaker than other descriptions. Quotations for best makes are about as follows:
makes quotations are about as follows:

Best Refined, Nos. 14 to 20	2.75¢ @ 2.85¢
Best Refined, Nos. 21 to 24	2.90¢ @ 3.00¢
Best Refined, Nos. 25 to 26	3.15¢ @ 3.20¢
Best Refined, No. 27	3.30¢ @ 3.40¢
Best Refined, No. 28	3.40¢ @ 3 50¢

Common, ¼¢ less than the above.

Quotations given as follows are for the best Open-Hearth Steel, ordinary Bessemer being about ¼¢ lower than are here named:

Best Soft Steel, Nos. 14 to 16	2¾¢ @ 2⅞¢
Best Soft Steel, Nos. 18 to 20	3¢ @ 3⅛¢
Best Soft Steel, Nos. 21 to 24	3¼¢ @ 3⅜¢
Best Soft Steel, Nos. 25 to 26	3½¢ @ 3¾¢
Best Soft Steel, Nos. 27 to 28	3¾¢ @ 4¢

Best Bloom Sheets, ¼¢ extra over the above prices.

Best Bloom, Galvanized, discount	@ 70 %
Common, discount	@ 72½ %

Old Material.—The market is extremely dull and while prices are nominally unchanged, only a limited business is possible at quoted rates, which are about as follows: Old Iron Rails, $18 @ $19, delivered; Old Street Rails, $19 @ $20; Old Steel Rails, $15 @ $16; No. 1 Railroad Scrap, $16 @ $16.50; Philadelphia, or for deliveries at mills in the interior, $16.50 @ $17.50, according to distance and quality; $8 @ $9 for No. 2 Light; $11 @ $12 for Machinery Scrap; $11 @ $12 for Wrought Turnings; $8 for Cast Borings, and nominally $20 for Old Fish Plates, and $13 @ $14 for Old Car Wheels.

Wrought-Iron Pipe.—There is quite a good business doing considering the season, and prices are said to be steadier than they have been for some time past, discounts quoted as follows, with the usual dealers' and jobbers' commission: Butt, Black, 55 %; Butt, Galvanized, 47½%; Lap, Black, 65 %; Lap, Galvanized, 55 %; Boiler Tubes, 65 % all sizes new list; Casing, 62½ % new list.

Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, CHICAGO, December 7, 1892.

We have a more encouraging state of affairs to report than last week. Quite a number of negotiations came to the point of settlement, which caused considerably more activity in the general market. The outlook has not changed, however, in any respect, the general condition continuing to point to a period of comparative quiet and ease in prices.

Pig Iron.—Business in this line has been a little better the past few days, especially with regard to local Coke Iron. Rather numerous sales have been made at about our quotations, some of which are for delivery covering a period of four or five months. Consumers are not anticipating their needs, as this would indicate, but in every case are covering contracts, which they have taken, believing that prices are on a very steady basis, and that they are taking little risk. Southern Pig Iron has been quiet. The remarks concerning Southern Iron in our report last week were not intended to indicate a general slump in prices. The largest makers are holding firmly on a basis of $10, Birmingham, for No. 2 Foundry and will not permit agents to make even 10¢ concession on this price. Good orders are known to have been refused the past week which had been offered at this rate. Small lots of Lake Superior Charcoal are selling at $17 cash or $17.50, four months. The manufacturers are very firm, and believe they will be able to maintain prices at their present level, and, perhaps, secure an advance should large buyers come in the market with heavy contracts. Quotations are as follows, cash f.o.b. Chicago:

Lake Superior Charcoal	$16.50	@	$17.00
Local Coke Foundry, No. 1	13.75	@	14.25
Local Coke Foundry, No. 2	13.50	@	14.00
Local Coke Foundry, No. 3	13.25	@	13.75
Local Scotch	14.25	@	14.75
Ohio Strong Softeners	16.25	@	17.00
Southern Coke, No. 1	14.75	@	15.25
Southern Coke, No. 2	13.60	@	14.00
Southern Coke, No. 3	13.10	@	13.25
Southern, No. 1, Soft	13.60	@	14.00
Southern, No. 2, Soft	13.00	@	13.25
Southern Gray Forge	12.85	@	13 10
Southern Mottled	12.50	@	12.75
Tennessee Charcoal, No. 1	16.50	@	17.50
Alabama Car Wheel	19.50	@	20.50
Coke Bessemer	14.50	@	15.00
Hocking Valley, No. 1	17.00	@	17.50
Jackson County Silvery	17.00	@	17.50

Bars.—It is reported that a purchase of 2000 tons of Car Iron has been made for spring delivery at about 1.60¢ flat, Chicago, and more car orders are pending. Prospects are favorable now for a considerable improvement in this particular line. The large railroads in this vicinity are

figuring on some good-sized purchases of cars in the near future, and orders in sight are said to aggregate 3000 to 4000. General trade is in fairly good shape, notwithstanding the efforts of small mills making a limited range of sizes to secure business at some concessions. The valley mills and others making a wide range are standing firmly at about 1.62½¢ @ 1.65¢, Chicago, half extras, and report that they have inquiries for 2000 to 3000 tons in various sized lots for delivery through the winter months, covering both manufacturing consumers and jobbers. As these mills are still very well supplied with work, there seems to be little danger of any serious change in prices. The reappearance of the Calumet Mill in the market comes at a time when orders are fairly numerous, and there should be little disturbance to values on this account. Soft Steel Bars are inclined to more firmness than a week ago, and the makers steadily quote 1.70¢ @ 1.75¢ for mill shipments. Jobbers are selling small lots from stock at 1.80¢ @ 1.90¢ for iron and 1.90¢ @ 2¢ for steel.

Structural Iron.—The past week has witnessed a better condition of trade than for several previous weeks. The Public Library contract for Beams, Columns and Girders, requiring between 2500 and 3000 tons, was secured by the Illinois Steel Company, after a sharp contest. The terms are private. The Augustine Hospital contract was secured by Jones & Laughlins. This being a seven-story building, will require several hundred tons of Beams. A strong demand from stock characterized the week, and the yards are now very short of material and behind in their orders. The Metropolitan Elevated Railroad will open bids the latter part of the week for a considerable portion of their structure. Mill lots of Beams are quoted at 2.25¢ @ 2.30¢, Chicago, with special terms ruling on large contracts, as a matter of course. Small lots are selling at 2.35¢ @ 2.50¢ from stock. Angles are quoted at 1.90¢ @ 2¢, for mill lots, and Sheared and Universal Plates at 2¢ @ 2.10¢. Small lots from stock are selling at 10¢ @ 15¢ ℔ 100 advance on these figures.

Plates.—Mill business has latterly been decidedly quiet, although stocks here are running low and will soon have to be replenished. Dealers report a large trade in progress from stock, with excellent prospects for its continuance. November was the best month known in the history of the large jobbing houses here. Tubes are well maintained at 65 % discount for all sizes. Prices for mill shipment, Chicago delivery, are about as follows: Tank Steel, 2.05¢ @ 2.10¢; Shell Steel, 2.12½¢ @ 2.25¢; Flange Steel, 2.25¢ @ 2.40¢. Quotations from stock are as follows: Tank Steel, 2.30¢ @ 2.50¢; Shell Steel, 2.60¢ @ 2.75¢; Flange Steel, 2.75¢ @ 3¢; Iron Sheets, Nos. 10 to 14 gauge, 2.45¢ @ 2.60¢; Steel Sheets, Nos. 10 to 14 gauge, 2.50¢ @ 2.75¢. Boiler Tubes are firm at 67½ % discount.

Sheets.—The market for Black Sheets is not specially active, although inquiries are fairly numerous and mills are reported to be well supplied with work. Common Black Sheets, Chicago delivery, are quoted as follows: No. 24, 2.75¢; No. 26, 2.85¢; No. 27, 2.95¢; No. 28, 3.10¢; No. 30, 3.55¢. Soft Steel Sheets are selling at $1 @ $2 ℔ ton advance on these prices. Galvanized Sheets are selling in small lots only, although merchants think they would be able to do a larger business if they could get deliveries more rapidly from the mills. Carload lots are selling at 70 and 5% @ 70 and 7½% discount for Juniata, and small lots 70% off. A slight advance has been made on sheet copper in large quantities in sympathy with the recent upward movement in ingot copper. Small lots show no change as yet, but continue to be quoted at 30% discount.

Merchant Steel.—No change is reported in this department of trade. Quotations continue about as follows: Open-Hearth Machinery and Spring Steel, mill shipment, Chicago delivery, 1.90¢ @ 2 15¢; Tire Steel, 1.85¢ @ 2¢; Ordinary Tool Steel, 6½¢ and upward, according to quality.

Billets and Rods.—A sale of 4000 tons of Billets is reported at $24 75. Wire Rods are held at $33, with very little doing. The local supply is now in a little better condition, owing to the failure of the Joliet Enterprise Company and the withdrawal of their large consumptive requirements.

Rails and Track Supplies.—The Rail business is very slack as the close of the year approaches. The mills here will discontinue operations in the course of a week or two for the purpose of making their annual repairs. Quotations are unchanged at $31 and upward, according to the size of the order. Inquiries are in the market for Splice Bars for next year's delivery, and some considerable transactions are expected to be closed within the next few days. Iron and Steel Solice Bars are unchanged at 1.75¢ @ 1.80¢; Track Bolts with Hexagon Nuts, 2.65¢ @ 2.75¢, and Spikes, 2.05¢ @ 2.10¢.

Old Rails and Wheels.—The offerings of Old Iron Rails are considerably larger than they have been, and in the absence of buyers the market naturally appears a little weaker. No transactions have been reported and dealers believe that it would now be difficult to obtain over $18.50. Old Steel Rails are in very light demand, with long lengths quoted at $15 and short pieces $12.75. Car Wheels are very quiet. Dealers have offered $14.25 @ $14.50 to railroad companies, as their views of the market, but have failed to obtain the Wheels. The railroad companies are evidently making negotiations directly with consumers, as they have for some time done, to the exclusion of dealers.

Scrap.—A little more inquiry is reported for Wrought. Consumers are talking of taking considerable quantities after January 1. The starting up of the Calumet Mill will help the local market for Scrap very materially. Dealers are not pressing their stock for sale on the market, but are awaiting developments quietly, and the consequence is that quotations are well maintained at the figures given last week: No. 1 Railroad, $16 @ $16.50; No. 1 Forge, $15 @ $15.50; No. 1 Mill, $11; Pipes and Tubes, $10; Horseshoes, $16; Sheet Iron, $6; Cast Borings, $6.25; Wrought Turnings, $9; Axle Turnings, $9.50; Machinery Cast, $11.50 @ $12; Stove Plate, $9; Malleable Cast, $10; Car Axles, $18.50 @ $19; Fish Plates, $17.25; Mixed Steel, gross ton, $11; Coil Steel, $15; Leaf Steel, $16.50, and Tires, $15.

Metals.—Lake Copper is firm at 12¾¢ carloads, and 13¢ small lots. Casting Brands are in good inquiry with carloads quoted 11¾¢. Spelter is quiet at 4.25¢ asked. Pig Lead is dull with only single carload transactions reported at 3.52¢ @ 3.60¢.

Rogers, Brown & Merwin announce the removal of their offices to 1014 and 1016 "The Monadnock," southwest corner Dearborn and Jackson streets. A continued growth in the volume of their business has made more spacious office quarters a necessity, and the new location gives them largely increased facilities for the handling of all matters pertaining to Pig Iron and similar products.

Charles Himrod & Co., 935 Rookery Building, Chicago, have secured the agency in Chicago territory for the sale of the Florence Cotton & Iron Company's Philadelphia Pig Iron, produced by their new furnace in Alabama. It is the intention of this company to manufacture a Pig Iron which is soft, fluid and of fair strength, suitable for carrying scrap and as a softener in a mixture with Irons made from Lake Superior Ore.

Louisville.

LOUISVILLE, KY., December 3, 1892.

There has been no change in prices, Iron continuing to sell for long delivery on basis of former sales. For prompt delivery one or two furnaces are offering below the prices held by the leading companies, but this has been their action throughout the year. Manufacturers report that while they are pushed for prompt shipments, orders for future delivery are not coming in to their satisfaction; they, however, feel that this may be owing to the close of the year, and that in January business will revive and be satisfactory, with a tendency toward higher prices. Buying here has been for delivery during the first six months of the year, and many of the buyers have purchased what they desire. The largest sale of the week was 1000 tons of No. 2 Soft. We quote for cash, f.o.b cars Louisville:

Southern Coke, No. 1 Foundry	$13.25	@	$13.50
Southern Coke, No. 2 Foundry	12.00	@	12.25
Southern Coke, No. 3 Foundry	11.50	@	11.75
Southern Coke, Gray Forge	11.00	@	11.25
Southern Charcoal, No. 1 Foundry	15.00	@	16.00
Southern Car Wheel	17.50	@	17.75

Cleveland.

CLEVELAND, OHIO, December 5, 1892.

Iron Ore.—The maximum estimate made last week of the total Ore shipments for the season—8,250,000 tons—proves to be very nearly correct. The exact figures will not be known for a few days, as a few scattering cargoes are still coming in, but the total will not vary greatly from 8,300,000 tons. Some selling is going, but only in a hit and miss way, buyers building out their stocks whenever they can find an odd lot of desirable Ore. Good Bessemer Hematites can be had at figures very close to $4 ℔ ton and Non-Bessemers at $3 @ $3.15. A few sales of Non-Bessemer Specular and Magnetic Ores at $4 are reported, but the rich Bessemer Ores are well sold up. The call from the furnaces is heavier than for some time past, 42,000 tons having been forwarded during the past week, as compared with 29,000 tons for the same week in 1891. For the past season the shipments to the furnaces have aggregated 4,050,000 tons, the largest in the history of the Iron-Ore trade. Buyers say that there have been absolutely no negotiations regarding next season's prices, but there will be something done soon after the holidays.

Pig Iron.—Small sales are still the rule. The increased firmness noticed last week in Foundry Irons has extended to Bessemers, although the volume of business does not improve. Dealers do not anticipate any very considerable changes until after the holidays. Buyers seem to look upon the market somewhat shyly, and are not anticipating their wants to any considerable extent, excepting, perhaps, where a few orders for Foundry Iron have been placed. Following are the local quotations:

Nos. 1 to 6 Lake Superior Charcoal	.....		$17.00
Nos. 1, 2 and 3 Bessemer, per ton.	14.00	@	14.25
No. 1 Strong Foundry, per ton.	14.50	@	14.75
No. 2 Strong Foundry, per ton.	13.50	@	13 75
No. 1 American Scotch, per ton.	14.50	@	14 75
No. 2 American Scot h, per ton.	13.50	@	13.75
No. 1 Soft Silvery, per ton.	14.50	@	15 00
Mahoning and Shenango Valley Neutral Mill Irons, per ton.	12 50	@	13.00
Mahoning and Shenango Valley Red Short Mills, per ton.	13.00	@	13.25

Bar Iron.—Good business is reported for Common Bar Iron at 1.60¢. The demand is particularly brisk.

Old Rails.—Business seems picking up a bit, and several sales of Old Americans at $19.50 @ $20 are announced. The separate amounts were not large, but the aggregate sales have been larger than for several weeks past.

Nails.—The demand is only fair, and prices do not improve. This is especially true of Wire Nails, which are quoted at $1.60 in stock.

Scrap.—Very little is being done, and prices remain stationary at old quotations.

St. Louis.

Office of *The Iron Age*,
Bank of Commerce Building,
ST. LOUIS, December 5, 1892.

Pig Iron.—The weakening tendency noted last week continues to be more apparent, and in the absence of sales of any moment is likely to be more or less permanent. Consumers are not negotiating for any large quantities, preferring rather to purchase as their needs require. Furnaces do not seem to be so well supplied as supposed, as is evidenced by the fact that the prices they are now willing to accept business at are somewhat lower than those prevailing a week or ten days since. A serious break in prices is not anticipated. On the other hand, a gradual shaving process is expected, and the decline will be gradual, at least until the next sixty days have elapsed. By February 1 trade will perhaps begin to improve, and prices will doubtless move in unison. Locally, trade is in good shape, and consumption keeps up to the average. Some furnaces still maintain full prices, but they are not filling many orders, while others who are shading prices get what little business there is. Production is gaining on consumption, and in the long run this is the feature of the market which will tend to repress it more quickly than any other. We cannot see anything in the immediate future to base any calculation on which is favorable to higher prices. Under these circumstances, limited buying for immediate wants is probably the safe course to pursue. Sales during the past week were confined to carload quantities with one or two lots of 100 tons. We quote as follows for cash, f.o.b. cars St. Louis:

Southern Coke, No. 1 Foundry,	$14.25 @ $14.50
Southern Coke, No. 2 Foundry,	13.00 @ 13.25
Southern Coke, No. 3 Foundry,	12.50 @ 12.75
Gray Forge	12 00 @ 12.25
Southern Charcoal, No. 1 Foundry	15.75 @ 16.00
Southern Charcoal, No. 2 Foundry	15.25 @ 15.50
Missouri Charcoal, No. 1 Foundry	14.50 @ 14.75
Missouri Charcoal, No. 2 Foundry	14.00 @ 14.25
Ohio Softeners	16.50 @ 16.75
Southern Car Wheel	18.25 @ 18.50

Bar Iron.—Business in this department is not particularly active. Car manufacturers are busy, but have anticipated their wants up to the close of the year, and are out of the market. Jobbers are quite busy and report a good demand at unchanged prices. We quote as follows: From mill 1.60¢ @ 1.62½¢, half extras, f.o.b. cars East St. Louis. Jobbers ask 1.70¢ @ 1.75¢ from store, according to quantity.

Barb Wire.—Trade continues to fall off and prices do not show any improvement. The failure of the Enterprise Mfg. Company of Joliet, Ill., will no doubt throw considerable quantities of Barb Wire on the market, and this may have the effect of weakening prices. At the moment, however, prices are unchanged, and are quoted as follows: Painted from mill, $2.20; Galvanized, $2.65.

Wire Nails.—The season for the sale of Wire Nails is practically over and the demand is light in consequence. Prices are unchanged as follows: Mills quote $1.65, f.o.b. cars here, which is pretty close to the lowest price being made.

(*By Telegraph.*)

Pig Lead.—The movement in Pig Lead is restricted to small lots which are sold on the basis of 3.50¢. Trade fails to improve, and unless the demand increases a lower range of values will doubtless prevail.

Spelter.—This metal is dull and neglected at 4.12½¢. We hear of offerings at 4.10¢, but are unable to trace them to a satisfactory source. The market to-day is practically 4.12½¢ bid and 4.15¢ asked.

Pittsburgh.

Office of *The Iron Age*, Hamilton Building,
PITTSBURGH, December 6, 1892.

The first week of December did not exhibit any encouraging features over November, but on the contrary the situation is becoming grave in some respects and the future is regarded with considerable apprehension. The volume of business has fallen off very largely within the last month, and with an immense productive capacity to be employed, mills are reaching out after business and prices are being shaded to an extent that means that cost is probably being reached in some cases where mills have not the advantage of equipment possessed by some of their competitors. These statements apply particularly to Structural Material, Steel Plates, Wire Nails and Barb Wire, which are now being sold at much lower prices in many cases than have ever been reached before. The decline in prices which set in about a month ago has been general all along the line, and present indications are that still lower prices will prevail unless a very material increase in volume of business takes place, the prospects for which are not very assuring. Since our last report a very material decline in Bessemer Pig has occurred, and Soft Steel also continues to drop backward, with volume of business in both materials very much restricted.

Pig Iron.—The week under review was extremely quiet, and confidence among buyers seems to have completely disappeared. The recent spurt in the price of Bessemer Pig was largely due to the advance in Soft Steel, and the decline in Steel is taking Bessemer with it at a pretty rapid gait. Comparatively little material is changing hands, buying being done nearly altogether in small lots ranging from 500 to 2000 tons, and for immediate requirements. The impression is general that prices will still further recede unless an improved demand is soon experienced. In Gray Forge Iron the situation is better, prices being firmly maintained on a basis of $12.50, Pittsburgh, with a fair tonnage moving. The report that this price was being shaded for large blocks is denied. A fair amount of Foundry Iron is changing hands on a basis of $14 for No. 1, and $13 for No. 2, f.o.b. cars, Pittsburgh. During November, 23 active stacks in Allegheny County turned out 152,250 tons of Bessemer, Gray Forge, Foundry and Spiegel Iron. On December 1, three stacks were idle, these being Soho, one Eliza and one Edgar Thomson. We have reduced prices on Bessemer, and it is intimated that the lower price named has been shaded in more than one instance during the past week. We quote the market as follows:

Neutral Gray Forge		$12.50	cash.
All-Ore Mill	$12.50 @	12.75,	"
No. 1 Foundry	14.00 @	14.10,	"
No. 2 Foundry	13.00 @	13.10,	"
Charcoal Foundry No. 1	19.00 @	19.50,	"
Charcoal Foundry No. 2	19.50 @	20.00,	"
Bessemer Iron	13.85 @	14.00,	"

We note a sale of 4000 tons of Gray Forge, equal deliveries in December, January and February at $12.50, Pittsburgh. Also a sale of 3000 tons of Bessemer, equal deliveries in January and February, on a basis of $13.85, Pittsburgh; 1500 tons for December and January at $13 90, and 2000 tons for same delivery at $14, Pittsburgh. A large steel concern is negotiating for a block of Bessemer, which may be closed before this week is out.

Billets.—Probably the most encouraging feature which we have to report this week is the announcement that the Edgar Thomson Mill, which has been on Billets for some weeks past, has again gone on Rails, the change having been made on Wednesday, December 7. This move will take from 1000 to 1200 tons per day out of the market, and will do much to relieve the pressure that has been noticeable for some time. In other respects the situation remains in about the sams condition as noted last week. Buyers and sellers are getting closer together, but prices have not yet reached that point where it is considered safe to anticipate future wants to any extent. We understand that a Cleveland buyer is in the market for a large tonnage, but has set the price at such a figure that the order has not as yet been accepted. It is not improbable that the deal will be closed before this week is out. A disturbing feature in connection with the Billet market just now is the fact that a good many Billets are in the hands of speculators and are being offered at very low prices, which has, no doubt, done much to bring about the present unsettled condition of the market. Since our report of last week prices have shown a further decline, but as yet transactions are limited in number and to small amounts. We note a sale of 500 tons, equal deliveries, in the first four months of next year at a price said to be $23.75 at buyers' mill, the freight being 85¢, the Billets netting the maker $22.90, f.o.b. at works. We also note a sale of 2000 tons for delivery in December, January, February and March at $25 at Philadelphia, the freight being $2.30, the Billets netting the maker $22.70. Reports are going of offers at considerably lower prices than those named above, one buyer stating that he has been offered Billets at a price equal to $22.35 at makers' works. Reports are also going that offers have been made to cancel several lots of Billets bought for delivery next year. While it cannot be denied that the advantage still remains with buyers, it is the impression that the withdrawal of Edgar Thomson from Billets will have no little effect on the situation.

Ferromanganese.—The market is quiet and the demand is confined exclusively to small lots. We quote Domestic at $62, f.o.b. at makers' works.

Structural Material.—The resumption of operations in full at Homestead has had a material effect on the situation, and we understand that prices have been shaded more liberally within the last two or three weeks than for some time past. The volume of business is only fair and orders coming in are principally for small lots, the aggregate representing a fair tonnage. We quote prices as follows: Beams and Channels from 2¢ to 2.25¢ according to size of order; Angles bring from 1.75¢ to 2¢; Universal Mill Plates, 1.75¢ @ 1.85¢; Z Bars, 2¢, and Tees, 2.25¢.

Muck Bars.—The market is dull and lifeless and a very small tonnage is moving. The rapid decline in the price of Soft Steel has resulted in many consumers of Muck Bar again taking up Soft Steel in preference. We quote the market nominally at $24.50 for best grades of Bars, f. o. b. cars, Pittsburgh.

Steel Rails.—As noted elsewhere in this report, the Edgar Thomson Mill has again gone on Rails for an indefinite period. We understand that sufficient orders have been received to warrant this change being made. Prices are without change, being $30, f.o.b. at mill, for standard sections.

Steel Plates.—We are advised that considerable tonnage is moving, a large order for Tank Steel having been placed in this city last week. Buyers, however, continue to have the advantage of active competition among makers, and as a result very low prices have recently been named. As is the case with other lines, the entrance of the Carnegie concern into the market has placed smaller concerns at somewhat of a disadvantage in order to secure business. We quote prices as follows: Bridge Plates, 2¢ @ 2.10¢; Flange, 2.10¢; Fire-Box, 3.50¢; Tank, 1.75¢; Shell, 2¢ @ 2.25¢. As noted above, these prices have been materially shaded on several large orders recently placed.

Merchant Steel.—A considerable falling off in volume of business is reported, and orders now coming in are for small lots. It is reported that prices are easing up to some extent on account of competition among makers to secure what little business there is going. Several concerns in this city are yet running on orders booked some time ago, and will not have these cleaned up for some little time yet. We quote Open-Hearth Spring and Machinery at 1.95¢ @ 2.05¢; Tire Steel, 1.85¢ @ 2¢; Toe Calk, 2.25¢, and Sleigh Shoe, Flat Bars not tempered or tapered, 2¢; Tool Steel we quote from 6¢ upward, according to grade.

Wire Rods.—On account of the inactivity in the Wire Nail and Wire trades the market for Wire Rods is extremely quiet, and very little business has been placed for some time. We quote the market at $31, Pittsburgh, but this price would no doubt be materially shaded for a good-sized order.

Wire and Cut Nails.—The discouraging condition existing in the Wire-Nail trade for some time past continues, and the outlook for the future is far from promising. Within the past week or two several makers have shown a distinct tendency to lessen stocks, and in order to do this buyers are being offered very low prices. We quote Wire Nails at $1.45 in carload lots, but this price would no doubt be shaded for a desirable order. The situation in the Wire-Nail trade is reflected in the Cut-Nail trade. Several makers in the Wheeling district have recently solicited orders in this city, and are said to have named extremely low prices. We quote Cut Nails on a basis of $1.42½ @ $1.45 on a 30¢ average, f.o.b. in Wheeling district.

Barb Wire.—Trade continues very quiet and makers do not look for any material improvement in the demand before January or February. During those two months buyers generally look about with a view of placing spring orders, and when this occurs makers expect that the volume of business will be largely increased. Prices continue very low, both Painted and Galvanized Barb Wire being lower in price at this time than ever before in the history of the trade. One large maker who has been in the business for many years advises us that ten years ago Painted Barb Wire was selling at 9¢ and Galvanized at 10¢ ₱ lb. It is stated that wages are very little lower now than they were when these high prices were being obtained. We quote Painted Barb Wire at $2.05 @ $2.10; Galvanized at $2.45 @ $2.50, both in carload lots. These prices, however, continue to be shaded where large orders are involved.

Merchant Bars.—Trade is in fairly satisfactory condition, although the volume of business is not as large by any means as it was 60 days ago. However, a fair run of small orders is going, which, combined with the orders booked some time ago, serves to keep the mills moderately well employed. In the Mahoning valley the mills are very busy, and some complaints are still heard from customers regarding delay in shipments. In the valley, Bars are still held at 1.50¢, half extras, and it is believed that it would take a very good order to shade this price to any extent. We are advised that the difficulty at the plate mills of the Mahoning Valley Iron Company, at Youngstown, which has existed for five or six months, has been settled to the entire satisfaction of the firm. The department in question has been classed as a Plate mill by the Amalgamated Association and started up in full this week. In this city No. 1 Bars continue to rule at 1.60¢ @ 1 70¢, and Old Rail and Scrap Bars at 1.55¢ @ 1.60¢. It is stated that buyers are able to secure concessions on these prices on orders for next year delivery.

Sheets.—A large demand is reported and prices are being firmly maintained. We repeat quotations of last week, as follows: No. 24, 2.60¢; No. 27, 2.70¢, and No. 28, 2.80¢, in carload lots.

Skelp Iron.—In sympathy with other lines, the demand for Skelp has fallen off to some extent, although there continue to be a good many orders going for small lots. Considerable Steel Skelp is now being sold in this market, much of it coming from the Wheeling district. We quote Grooved at 1.57½¢ @ 1.62½¢, and Sheared at 1.77½¢ @ 1.82½¢, four months, or 2% off for cash.

Pipes and Tubes.—Reports are going that certain makers belonging to the Wrought Iron Pipe and Tube Manufacturers' Association who have about cleared their order books are disregarding the new list adopted in Pittsburgh on November 16 and are offering to shade those discounts materially in order to capture new business. The season has now arrived when Pipe laying is almost wholly discontinued, and as a result there will be a much lighter demand for the next three or four months.

Old Rails.—The market is extremely quiet, and the outlook for the future is not encouraging. Prices are also weakening to some extent, and we now quote as follows: Old Steel Rails, short lengths, $15.50 @ $16; long lengths, $15.25 @ $15.50, and miscellaneous lengths, $15. Old Iron Rails are scarce, and we quote these at $20 @ $20.50 in the Mahoning Valley.

Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fourth and Main Sts., CINCINNATI, December 7, 1892.

The volume of business in Pig Iron has been unusually small during the week and in strong contrast with what it was a few weeks ago, but this is not unexpected at this season of the year, and as the stronger iron companies and furnaces in the South have their order books filled with all they can produce in the next two or three months they do not feel uneasy. That consumption is going forward satisfactorily is attested by their urgency to make prompt deliveries on previous contracts and in some instances application to have iron due on January contracts delivered this month. The idea of consumers evidently is to keep close to shore and be ready for any change which possible legislation this winter may impose. While the volume of business in Southern Iron is light, seldom reaching 500 tons, there have been some considerable sales of Ohio Softeners, but nothing has occurred to warrant any change in quotations. There have been moderate sales of Southern Charcoal Car-Wheel Iron. It is probably true that to effect sales of round lots of Iron concession would have to be made, but there are no urgent offerings and no one wants to be the first to make such concessions. Quotations are as follows:

Foundry.	
Southern Coke, No. 1	$13.75 @ $14.00
Southern Coke, No. 2	12.50 @ 12.75
Southern Coke, No. 3	12.00 @ 12.25
Ohio Soft Stone Coal, No. 1	16.00 @ 16.50
Ohio Soft Stone Coal, No. 2	15.00 @ 15.50
Mahoning and Shenango Valley	15.75 @ 16.75
Hanging Rock Charcoal, No. 1	19.15 @ 19.50
Hanging Rock Charcoal, No. 2	18.00 @ 19.00
Tennessee and Alabama Charcoal, No. 1	16.50 @ 17.00
Tennessee and Alabama Charcoal, No. 2	15.50 @ 16.00
Forge.	
Gray Forge	11.50 @ 11.75
Mottled Neutral Coke	11.25 @ 11.50
Car Wheel and Malleable Irons.	
Standard Southern Car Wheel	18.75 @ 19.00
Lake Superior Car Wheel and Malleable	17.75 @ 18.00

Detroit.

WILLIAM F. JARVIS & Co. of Detroit, Mich., under date of December 5, writes: The market has changed but slightly within the past week. Lake Superior Charcoal Iron shows more strength than any other grade, but business is quiet and only an occasional order for any larger quantity than 50 to 100 tons is booked. Southern Irons are not very active and buyers are waiting to place any large orders until after the first of the year. Some few brands of Ohio Coke Irons are in a little better demand on account of their very high qualities as softeners. Prices on all grades remain practically unchanged, the advance in Lake Superior Charcoal is being adhered to, and, unless statistics show an increase in stocks in November, there may be further advances in this grade. Finished Iron is in fair demand, and prices a trifle lower.

With a quiet market and only fair demand, we quote as follows:

Lake Superior Charcoal, all numbers	$17.00 @ $17.50
Lake Superior Coke, Bessemer	16.00 @ 16.50
Lake Superior Coke, Foundry, all ore	16.00 @ 17.00
Standard Ohio Blackband (40 per cent.)	16.50 @ 17.00
Southern No. 1	14.50 @ 15.00
Southern Gray Forge	12.50 @ 13.00
Jackson County (Ohio) Silvery	17.75 @ 18.25

New York.

Office of *The Iron Age*, 96-102 Reade street, NEW YORK, December 7 1892.

American Pig.—Business has been very light during the past week, buyers not taking any notable quantities for future delivery, while current requirements are thoroughly covered. We quote Northern brands at $15 @ $15.50 for No. 1; $14 @ $14.50 for No. 2; $13 @ $13.50 for Gray Forge, tidewater. Southern Iron, same delivery, $14.75 @ $15 for No. 1; $13.75 @ $14 for No. 2 and No. 1 Soft; $13.25 @ $13.50 for No. 2 Soft; $12.75 @ $13 for Gray Forge.

Ferromanganese.—Very little business has been done in foreign Ferromanganese, which remains $60.50 @ $61 for 80%. Nothing is doing in Spiegeleisen.

Billets and Rods.—No sales of any consequence have been made in this market, in Billets, nor is anything reported in Wire Rods, domestic or foreign. We quote Steel Billets, tidewater, $24.50 @ $25; foreign, $29 50 @ $30; Wire Rods, $33.25 @ $33.50; foreign Wire Rods, $40 @ $40.50, and Swedish Rods, $54.50 @ $56.

Steel Rails—The Bethlehem mill has closed down for lack of orders, and the other Eastern mills are also running very light. There are no orders of any consequence in the market as yet, and quotations remain $30 for standard sections.

Manufactured Iron and Steel.—Within a day or two at least one large contract in this vicinity will be let and the material for another will be placed. Next week there will come up the placing of one battleship and one cruiser at Washington, which will call for about 3000 tons of Deck Plates and 600 tons of Boiler Plates, besides the Protective Deck Plates and the armor. Business in Structural Material and in Plates has been confined to small lots for early delivery, so that the market has not been tested for larger orders, winter delivery. While no sharp cuts have been made, the fear hangs over the market that they may possibly come. We quote Beams at 2.35¢ @ 2.75¢ for small lots and 2.15¢ @ 2.50¢ for round lots, according to sizes; Angles, 1.85¢ @ 2¢; Sheared Plates, 1.85¢ @ 2.10¢; Tees, 2.20¢ @ 2.75¢; Channels, 2.20¢ @ 2.50¢, on dock. Car Truck Channels, 2¢ @ 2.10¢. Steel Plates are 1.85¢ @ 2¢ for Tank; 2.20¢ @ 2.25¢ for Shell; 2.50¢ @ 2.65¢ for Flange; 2.6¢ @ 2.75¢ for Marine, and 2.70¢ @ 2.80¢ for Fire Box, on dock. Refined Bars are 1.67½¢ @ 1.9¢, on dock; Common, 1.55¢ @ 1.60¢. Scrap Axles are quotable at 1.90¢ @ 2.10¢, delivered. Steel Axles, 1.90¢ @ 2.1¢, and Links and Pins, 2¢ @ 2.20¢; Steel Hoops, 1.90¢ @ 2¢, delivered.

Track Material.—We quote Spikes, 1.90¢ @ 2¢; Fish Plates, 1.60¢ @ 1.65¢; Track Bolts, square nuts, 2.40¢ @ 2.60¢, and hexagon nuts, 2.70¢ @ 2.80¢, delivered.

Stock Warrants—The American Pig Iron Storage Warrant Company report as follows:

	Tons.
Stock in yard November 1, 1892	83,200
Put in yard for 30 days ending November 30, 1892	300
Total	83,500
Withdrawn 30 days ending November 30, 1892	1,900
Net stock in yard November 30, 1892	81,600

Metal Market.

Copper.—Freight room has been engaged recently for the shipment of 500 tons of Lake Superior Ingot from this port to Havre. The shipment, it is learned on good authority, is on account of a late purchase from the Calumet & Hecla Company at 12¢ ℔ lb. Apart from this, nothing of interest has developed during the past week. Few, if any, new export orders have been received, and the home trade demand is momentarily rather slow, large consumers having their probable wants during the next two or three months well provided for. Despite slowness of demand at the moment, there is, however, no sign of pressure to sell or weakening in values. The Lake producers are generally holding Ingot at 12¼¢, and the lowest price named on outside lots is 12¼¢. Some few parcels have been sold privately at the latter rate. On the Metal Exchange sales are recorded of 25,000 lb at 12¼¢ for January, and 50,000 lb at 12¼¢ @ 12.30¢ for February delivery. In Casting Copper there is little doing at the moment, but late considerable sales have smelters in a fairly comfortable position, and for most brands 11½¢ is quoted. Outside lots might be secured to a limited extent at a shade less. For Arizona Pig, 10½¢ is asked, but business in this, as in other product, is rather slow for the time being.

Pig Tin.—During the early part of the week under review the market was so manipulated that prices were carried up a few points in the face of a downward movement in values in the London market. While the deal was being engineered, some operators were forced to cover their short sales, but when the "bear" interest was whittled down no support remained and prices gracefully tumbled in sympathy with a sharp break in London. Spot stock dropped from 20.07½¢ to 19¾¢. December delivery underwent a similar decline and January sold relatively as low. The surface appearances are that, while prices were made to order, for a time, to suit certain interests, the relation of supply and demand eventually asserted its force, with the result above outlined. Cables to the Metal Exchange reported shipments from the Straits during November as being 2375 tons to Great Britain and America and 500 tons to the Continent. Shipments during the months of October and November aggregated no less than 6150 tons, a total considerably in excess of the consumption during the same period. Along with liberal spot stocks, this reflects a weak statistical position that is, doubtless, annoying to some leading speculators.

At the end of the week (Wednesday) the market was additionally depressed under the influence of weakness of the Silver market and greater pressure to sell Tin both here and in London. Deliveries as far ahead as March were let go at 19¾¢, while 10-ton lots were offered at 19.55¢ net cash on the spot and jobbing parcels at corresponding rates. The visible supply December 1 was 15,175 tons, against 14,916 on November 1.

Pig Lead.—The market has been exceedingly quiet and price for the metal has remained almost stationary. Single carloads were sold at 3¾¢ and larger sized lots at a shade less. At the price named the offering is free, but consumers are extremely indifferent buyers, and the low price does not appear to be much of an attraction elsewhere.

Spelter.—Western brands have been selling at 4⅛ @ 4.40¢ in carload lots. Those prices appear to be the lowest to which holders will accede at present, but the offering is still suggestive of burdensome holdings and generally weak position of the market.

Antimony.—Business has been moderate, and the market continues rather weak. Current quotations are 10¼¢ for Hallet's, 10¾¢ @ 11¢ for LX, 11¢ @ 11¼¢ for Crown and 11½¢ for Cookson's in round lots.

Tin Plate.—Business has been slow. Except for special sizes of Cokes there is little or no demand for future supplies and spot business continues moderate, with hardly enough doing to fairly establish market values. We quote spot prices as follows: Coke Tins—Penlan grade, IC, 14 x 20, scarce; J. B. grade, do., scarce; Bessemer full weight, scarce; light weights, $5.15 for 100 lb, $5.05 for 95-lb, $4.90 for 90 lb. Siemens Steel scarce. Stamping Plates—Bessemer Steel, Coke finish, IC basis, $5.60 @ $5.65; Siemens Steel, IC basis, $5.75; IX basis, $6.80 @ $6.85. IC Charcoals—Melyn grade, ½ X assortment, $6.40; Crosses, $8; Allaway grade, any assortment, $5.70; Crosses, $7.10; Grange grade, any assortment, $5.80; Crosses, $7.20. Charcoal Ternes—Worcester, 14 x 20, $5.70; do., 20 x 28, $11.40; M. F., 14 x 20, $7.75; do., 20 x 28, $15.75; Dean, 14 x 20, scarce; do., 20 x 28, $10.80; D. R. D. grade, 14 x 20, $5.35; do., 20 x 28, $10.60; Alyn, 14 x 20, $5.40; do., 20 x 28, $10.65; Dyffryn, 14 x 20, $5.65; do., 20 x 28, scarce. Wasters—S. T. P. grade, 14 x 20, $5.10; do., 20 x 28, $10; Abercarne grade, 14 x 20, $5; do., 20 x 28, $9.80.

British Iron and Metal Markets.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, December 7, 1892.

The movement in Pig Iron warrants has been extremely narrow and prices have remained almost stationary. Late dealings were at 41/9 for Scotch, 37/1½ for Cleveland and 46/ for Hematite. Stocks in Connal's stores include 345,000 tons Scotch and 16,000 tons Cleveland Pig. Cleveland district returns for November show a total production of 233,000 tons and an increase of 3,998 in stocks in makers' hands. Exports of Pig Iron last month aggregated 71,000 tons, against 74,000 tons in November, 1891.

In Pig Tin there has been a fall of £1 ℔ ton, with lively trading at the decline and considerable covering of "short" accounts at a good profit. Heavy shipments from the East last month, adverse advices from America, rather unfavorable statistics of supplies and absence of outside interest combined to depress the market.

Copper has yielded slightly under the influence of sales to realize on speculative holdings, but the market has since hardened in consequence of reported further reduction in American supplies and generally favorable statistics. The decrease in European stocks attracts particular attention, since the total is now the lowest on record for time since February, 1888. Since the middle of November sales of furnace material include 2800 tons Montana Matte, various deliveries, at from 9/6 up to 10/1½, with the latest dealings at the last named price.

Tin-Plate business has been light and confined chiefly to retail lots and special sizes. Several makers are quoting easier prices in order to secure business to keep mills in operation, but others who are more fortunately situated quoted higher rates. Stocks at shipping ports are now about 123,000 boxes, against 109,000 boxes at the corresponding period last year. Exports last month were 29,000 tons, of which 20,000 tons were to the United States. The total for November, 1891, was 28,000 tons, including 14,000 tons sent to the United States.

The Tredegar Steel Works have been closed down, owing to poor condition of business.

Scotch Pig Iron.—Market quiet, but prices for most brands fairly firm.

No. 1 Coltness,	f.o.b. Glasgow		55/
No. 1 Summerlee,	"	"	53/6
No. 1 Gartsherrie,	"	"	52/
No. 1 Langloan,	"	"	53/
No. 1 Carnbroe,	"	"	44/
No. 1 Shotts	"	at Leith	53/
No. 1 Glengarnock,	"	Ardrossan	49/6
No. 1 Dalmellington,	"	"	50/
No. 1 Eglinton,	"	"	46/6

Steamer freights, Glasgow to New York, 1/; Liverpool to New York, 7/6.

Cleveland Pig.—Business slow, but the market steady at 37/, f.o.b. shipping port, for No. 3 Middlesborough.

Bessemer Pig.—Market very quiet. Makers still ask 48/ for West Coast brands, Nos. 1, 2 and 3, f.o.b. shipping port.

Ferromanganese.—Dealings moderate and prices unchanged. English 80 % quoted at £11. 11/3, f.o.b. shipping port.

Steel Rails.—Demand continues slow and prices favor the buyer. Heavy sections quoted at £4, f.o.b. shipping port.

Steel Billets.—Market remains quiet, with prices barely steady. Bessemer, 2½ x 2½ inches, quoted at £4, f.o.b. shipping point.

Steel Blooms.—No improvement in the demand and prices easy. Makers quote £4 for 7 x 7, f.o.b. shipping point.

Steel Slabs.—Market dull and unchanged. Bessemer quoted at £3. 17/6, f.o.b. at shipping point.

Old Iron Rails.—There is more demand, but no change in prices. Tees quoted at £2. 10/ @ £2. 12/6 and Double Heads at £2. 15/, f.o.b.

Scrap Iron.—Sales somewhat better at former rates. Heavy Wrought Iron quoted at £2. 2/6 @ £2. 5/, f.o.b.

Crop Ends.—Market quiet and unchanged. Bessemer quoted at £2. 10/ @ £2. 12/6, f.o.b.

Manufactured Iron.—Common Staffordshire and Welsh Bars and Common Black Sheet easier. General market quiet. We quote, f.o.b. Liverpool:

	£	s.	d.		£	s.	d.
Staff. Ordinary Marked Bars	8	5	0	@	.....		
" Common "	6	7	6	@	6	10	0
Staff. Bl'k Sheet, singles....	.....			@	7	12	6
Welsh Bars (f.o.b. Wales)....	.....			@	5	8	9

Tin Plate.—Market at the close was steady but quiet. We quote, f.o.b. Liverpool:

IC Charcoal, Alloway grade	13/6 @ 14/
IC Bessemer Steel, Coke finish	12/3 @ 12/6
IC Siemens " " "	12/6 @ 12/9
IC Coke, B. V. grade 14 x 20	12/3 @ ....
Charcoal Terne, Dean grade	11/9 @ 12/

Pig Tin.—Prices irregular at the close and business slow. Straits sold at £90. 5/ @ £90. 10/ for spot and £90 @ £90. 10/ for three months' futures.

Copper.—Market closed rather easier. Merchant Bars quoted at £47. 5/ spot and £47. 12/6 three months' futures. Best selected, £52. 10/.

Lead.—Market quiet, but prices fairly steady at £10 for Soft Spanish.

Spelter.—Demand slow and the market easy at £18. 12/6 for ordinary Silesian.

The Ludlow-Saylor Wire Company, St. Louis, Mo., have under contract ten directory frames for the Wainwright Building, St. Louis, which when completed will hold over 2000 names. They report an active trade in all departments.

The Youngstown Steel Company are making extensive improvements at their Brier Hill Washed Metal Plant. The main building is being enlarged and the engine house fitted with the most modern machinery and appliances. The capacity of these works has been doubled in the past two years.

The nineteenth meeting of the Foundrymen's Association of Philadelphia is to be held to-day, John Birkinbine, president of the American Institute of Mining Engineers, having consented to address the members.

Ground has been broken for the erection of the new appraisers' warehouse on Greenwich and Christopher streets.

The Position of Tin.

For six months prior to the election Strauss, the English pig tin operator has been manipulating the world's market in anticipation of the 4 cents per pound duty which was expected to become operative July 1, 1893, under the terms of the McKinley law. Large stocks were rushed to this country, and the price steadily advanced. The arrivals for the year to December 1 were 19,200 tons. These, with stocks of 2000 tons, made the available supply 21,200 tons. The estimated consumption during that time was 16,450 tons, leaving 4750 tons in stock. This is the largest amount held at one time in this country in years. Now, it is pretty generally conceded by consumers of tin in this country that the duty of 4 cents will not become operative. Consequently, the advance in discount of the contingency has been checked and the reaction has set in. The result was a net decrease of 1 cent per pound in the price of current quotations during November, to 19.75 cents for spot and 19.80 cents for futures.

The London market is described as being in a condition bordering on demoralization, and is making frantic efforts to unload on America. Notwithstanding the heavy stocks on this side, rushed here to avoid the expected duty, and the declining prices—as showed preceding—the arrivals during November were 2600 tons. Moreover, the movement continues, and excellent authorities estimate the December receipts will aggregate 1600 tons.

It is a very eloquent commentary that during this heavy movement the American price has been either equal or below the London price, and the shipments in consequence were made at an actual loss, when freight and insurance are considered.

Pig-Iron Production.

Our returns are not, as yet, complete enough to allow of a presentation of a full report on the current production of pig iron. For some districts, however, the figures are available. Among the anthracite furnaces we have:

	Capacity. Tons.
New York, 4 furnaces	2,012
New Jersey, 3 furnaces	1,621
Spiegel, 3 furnaces	240
Lehigh Valley, 25 furnaces	11,259
Upper Susquehanna, 4 furnaces	2,835
Lower Susquehanna, 7 furnaces	4,696

This total of 46 active furnaces, with 22,657 tons weekly capacity on December 1, compares with 50 furnaces and 21,054 tons capacity on the first of November.

Pittsburgh shows 21 furnaces with 35,963 tons capacity, and two spiegel furnaces with 2985 tons capacity against 34,767 tons for the former, the latter remaining unchanged.

At New Castle, Pa., on Monday, the 5th inst., in the case of the claim of Peter Tillia to the money arising from the sheriff's sale of the Wampum Iron Company (Limited), the court dismissed the exceptions and directed that the costs of the proceedings be paid out of the proceeds of the sale of the property.

The Connellsville coke trade has fallen off in demand considerably during the past few weeks and production has been reduced to a considerable extent. A decrease of shipments to Pittsburgh has already shown a falling off of 50 cars per day. For the week ending November 26 there were 13,459 ovens in the Connellsville region in operation and 3797 idle, with a total estimated production of 118,163 tons per week. Compared with the production of the previous week, this shows a decrease of 8421 tons. The McClure Coke Company have blown out 20 ovens at Union and the H. C. Frick Coke Company have blown out 94 at White. The last named firm are actively pushing the sale of crushed coke, particularly in the Eastern markets, a number of agencies having been recently established in Eastern cities. It is stated that crushed coke has already proven a formidable rival of anthracite coal, and since the price of the latter has been increased, crushed coke is being used more largely than ever before.

The Tin-Plate Makers.

(*By Telegraph.*)

The regular semi-annual meeting of the Tinned Plate Manufacturers' Association of the United States was held in the Times Building, Pittsburgh, on Tuesday, the 6th inst. J. W. Britton, of Cleveland, Ohio, presided, and John Jarrett was secretary. The meeting was well attended, about 15 concerns being represented in person, while probably twice that number were represented by letter. The possible reduction of duties by the next Congress upon products manufactured by members of this association was thoroughly discussed, but there was little, if any uneasiness felt concerning any immediate action in this direction. It was the sense of the meeting that the development of the tin plate industry in this country will be prosecuted vigorously in the future as in the past. The secretary read a large number of letters from different concerns throughout the country, who are now either engaged in the manufacture of tin plates or propose to engage in this industry. In nearly all of these letters the assertion was made that there will be no halting in this important industry, but that its development will be pushed more actively than ever. F. G. Niedringhaus, who represented the St. Louis Stamping Company, stated that his firm was now turning out 8000 boxes of tin plates per week. Other firms stated that they were turning out as high as 5000 boxes per week and others as high as 2000 per week. The Morewood Tin Company, whose plant is located at Elizabethport, N. J., stated that they expected to have a capacity in the near future of 15,000 boxes per week.

The meeting was highly satisfactory to all members present, and it was the general opinion that the meetings should be held closer together instead of only twice a year, as is the custom at present. It was also decided that the Board of Managers should meet monthly, and in all probability, more frequent meetings of the association will be held in the near future. Considerable routine business was transacted, and considerable business was outlined for the future, the consummation of which will add much to the value of the association and to the members composing it. No definite date was fixed for the next meeting.

F. W. Sargent, formerly engineer of tests of the Chicago, Burlington & Quincy Railroad Company, and recently general agent for the Congdon Brake Shoe Company of Chicago, is now superintendent of the latter company's brake shoe and iron department.

J. B. May, formerly with the Standard Iron Company, Bridgeport, Ohio, has accepted the position of superintendent of the works of the Irondale Steel & Iron Company, at Anderson, Ind.

Locomotive builders are adding to their working force and enlarging their facilities.

HARDWARE.

Condition of Trade.

AS IS ALWAYS THE CASE at this season, there is a falling off in the volume of business and manufacturers who have been able to keep up with their orders report business quiet. A good many of them are, however, occupied on past orders. The jobbers are still doing a fair business of moderate volume, the demand continuing remarkably good in view of the lateness of the season. Holiday goods and winter specialties have still a prominent place. On all sides preparations are being made for taking stock, closing up the year's business and making arrangements for future trade, In the matter of price there is little to report. Staple goods continue at the low prices which have been ruling, but with unimportant variations. The condition of the market in Copper has a strengthening effect on goods in which this metal is largely used. Collections are generally referred to as exceptionally good. Altogether, the situation is normal and the prospect for a good business in the future is excellent.

Chicago.

(*By Telegraph.*)

The demand for Shelf Hardware is excellent for the season, and the outlook is very encouraging. The recent prevalence of open weather has stimulated trade in Nails, Roofing Tin and similar goods for finishing up outdoor work. Coke Tin Plate is very scarce, on account of a decided increase in the demand. Jobbers report their stock completely bare in the ordinary sizes. Manufactured Copper is moving up, in sympathy with the advance in Ingot Copper, and jobbers expect to advance rates on Sheets the coming week. Heavy Hardware is still in good demand, notwithstanding the lateness of the season, but jobbers look for a falling off from this time.

St. Louis.

(*By Telegraph.*)

The week under review has been satisfactory both as regards volume of trade and prices. Shelf Hardware is in good demand, especially from the West and Northwest. The Southern trade shows a decided improvement in all lines. Barbed and Plain Wire, Wire and Cut Nails are dull at unchanged prices. Holiday goods are, of course, very active at this time. Copper and Brass Goods are held very firm. In fact, the general outlook is decidedly encouraging, and jobbers have no hesitancy in predicting a good volume of trade from now up to the holidays.

Notes on Prices.

Cut Nails.—The Cut-Nail market is perhaps on the whole in a slightly better condition than for the past few weeks, inasmuch as there is a tendency among manufacturers to restrict production and to be conservative in the matter of quotations. This, however, has not resulted in any quotable change in the market, but some of the extreme concessions have been withdrawn and manufacturers are unwilling to name as low prices on present inquiries. The market is fairly represented by the quotation of $1.40 to $1.45 for carload lots on a 35 cent average. Prices in New York city are $1.75 to $1.85, and $1.60 to $1.75, according to average, for carload lots, f.o.b. dock. The demand for Nails both in the New York market and generally is referred to as fair.

Chicago, by Telegraph.—The Cut Steel Nail trade is quiet, and manufacturers look forward to a continuance of dullness until January, unless the weather proves unusually mild, which would help outdoor work. The Southern Hardware Jobbers' Association have started a movement in favor of a new Nail card to do away with the practice of selling on averages, and are appealing to manufacturers to get together and make the change desired. Local mills are well supplied with contracts, and quote $1 60 to $1.62½ on 30 cent average. Jobbers quote $1.65 to $1.70 on small lots from stock.

Wire Nails.—Wire Nails are still quoted at $1.50, carload lots, f.o.b. mill, but this figure is not rigidly adhered to, slight concessions being made when necessary. Small lots from store in New York are held at $1.80. The demand for Wire Nails is good, and manufacturers report a good many inquiries and orders from the trade. The volume of business during the season has been in excess of that of any former year.

Chicago, by telegraph.—Wire Nails are inclined to weakness, as manufacturers appear to be anxious to secure orders. The local mills are well supplied with contracts and quote close to $1.65, Chicago, but their competitors further East are naming $1.60 for immediate delivery. Large buyers desire deliveries scattered over the first quarter of the new year, hence sales are slow on the terms named. Jobbers quote small lots from stock $1.75.

Barb Wire.—There is little change in the Barb-Wire market, the demand continuing moderate and prices being somewhat irregular. As a general quotation the market is represented by $2.45 @ $2.50 for Four-Point Galvanized at mill. Prices in New York continue as for some time past, $3.10 for Four-Point Galvanized in small lots and $3 for carloads.

Chicago, by Telegraph.—The Joliet Enterprise failure has been the chief topic in Barb-Wire circles. As the company had a large stock of Barb Wire made up, there is some discussion of the effect it would have on prices if thrown upon the market. The other manufacturers, however, will see that arrangements are made to take care of it so that trade will not be affected. Orders for Barb Wire are moderately good, but prices are not being sustained at the figures given last week, namely, $2.25 for Painted and $2.70 for Galvanized. We hear of transactions in 50-ton lots on a basis of $2.10 and $2.55 respectively. Jobbers quote small lots from stock at $2.30 and $2.75.

Wire Rope.—The manufacturers of Wire Rope announce that on and after December 1 a discount of 45 per cent. will be given on Iron, Steel and Galvanized Wire Rope, Iron, Tin and Copper Sash Cord and Galvanized Strand to both consumers and dealers, with an additional discount of 2 per cent. for cash in ten days from date of invoice. It will thus be seen that the discount which has heretofore been given to the trade is withdrawn, and the one price named above is made alike to merchants and consumers. This change is not regarded with favor by the trade, and the policy thus inaugurated will tend to discourage the sale of Rope by the merchants.

Tinned Meat Hooks.—Humason & Beckley Mfg. Company, New Britain, Conn., and 80 Chambers street, New York, announce, under date December 1, the following revised list prices on Tinned Meat Hooks, which are subject to a discount of 80 and 25 per cent.:

To Drive.

Nos.	7	8	9	10
Size	3-16	1-4	5-16	3-8
Per gross	$7.50	$9.00	$14.00	$20.00

To Screw In.

Nos.	37	38	39	40
Size	3-16	1-4	5-16	3-8
Per gross	$8.50	$9.50	$15.00	$21.00

To Screw On, Bent.

Nos	13	14	15	16	17
Size	1-4	5-16	3-8	7-16	1-2
Per gross	$11.00	$14.00	$18.00	$24.00	$32.00

To Screw On, Straight.

Nos	25	26	27
Size	1-4	5-16	3-8
Per gross	$10.00	$11.00	$15.00

"S."

Nos.	30	31	32
Length, inches.	4	5	6
Size	1-4	5-16	3-8
Per gross	$14.00	$20.00	$30.00

For ¼-Inch Iron Bar, Round Iron.

Nos.	20	21	22
Size	5-16	3-8	1-2
Per gross	$25.00	$35.00	$60.00

For 2-Inch Bar, Square Iron.

Nos	11	11½	12	12½
Size	5-16	3-8	7-16	1-2
Per gross	$28.00	$42.00	$58.00	$65.00

Bright Wire, to Screw In.

Nos	0	3	4	5
Size, wire gauge	0	3	4	5
Per gross	$21.00	$12.00	$10.00	$9.00

Lead Pipe and Sheet Lead.—Under date December 1, Bailey, Farrell & Co., Pittsburgh, Pa., make the following reduced quotations on Lead Pipe and Sheet Lead, which are subject to a discount of 10 and 5 per cent.:

	Per pound.
Lead Pipe in whole coils	$0.05
Sheet Lead, in whole sheets	.05½

No change has been made by the Eastern manufacturers, whose quotations are 6½ cents for Lead Pipe and 7 cents for Sheet Lead, subject to a discount of 20 per cent.

Corkscrews.—Humson & Beckley Mfg. Company, New Britain, Conn., and 80 Chambers street, New York, announce, under date December 1, the following revised list prices on Corkscrews, which are subject to a discount of 40 and 10 per cent.:

No.	Per doz.	No.	Per doz.
0	$1.25	79	9.00
2	1.70	80	2.00
4	2.00	81	2.20
6	2.50	82	2.50
7	2.80	83	2.80
8	1.00	90	2.30
9	1.40	91	2.50
10	2.00	93	2.20
11	4.80	94	2.50
13	1.80	95	3.00
14	2.20	96	3.50
15	2.00	97	4.50
16	1.80	100	2.20
17	1.70	101	3.50
20	7 00	102	1.50
21	1.70	103	2.20
22	2.00	104	1.80
23	3.00	105	3.50
27	7.00	106	2.20
29	8.00	107	2.50
31	4.00	109	5.00
32	7.00	113	2.20
34	8.00	114	2.50
37	5.20	115	1.25
38	5.50	116	1.50
39	9.00	118	4.00
40	2.20	119	1.80
41	2.50	122	2.20
42	3.00	123	4.50
45	3.00	124	6.00
47	4 00	125	10.00
48	6.00	127	3.00
50	4.50	129	3.50
51	2.50	131	4.50
54	4.00	132	1.50
55	8.00	134	1.80
56	7.00	136	2.20
57	4.50	137	2.50
58	2.80	139	5.00
60	5.20	140	5.00
61	5.50	141	8.50
64	5.00	142	10.00
66	4.00	143	5.00
67	2.50	144	8.50
68	4.00	145	10.00
70	7.00	300	1.25
71	3.00	400	30.00
73	4.00	500	36.00
74	6.00	600	30.00
77	2.00	700	25.00
78	5.00	800	20.00

Glass.—The only result of the meeting in Chicago of the Glass manufacturers held last week was the reaffirming of present prices. This action was made possible by the existing demand for Glass, but it was not considered that the condition of the market justified an advance. Trade at the factories is reported good, and jobbers find difficulty in keeping an assortment of regular sizes in stock. Local trade in the city is reported as slow in Window Glass, while the nearness of the holidays has stimulated the demand for Picture Glass. Prices at store and factories are well sustained, as quoted below. Imported Glass holds firm at regular quotations, with a fair demand. The same unsettled condition continues in the American Plate Glass market, and the demoralization in prices has extended to imported Plate. While the nominal quotations given below hold good for small lots, prices are cut to secure large orders. In bidding on large orders, the dealers in both American and imported Plate Glass enter the contest with the above results. It is thought that this suicidal competition will work its own cure, and that some regular price will be established. Quotations are as follows: American Window Glass, 1000-box lots or more, 80 and 15 per cent. discount; carloads, 80 and 10 per cent. discount; less than carloads, 80 and 5 per cent. discount. French Window Glass, 75 and 10 and 5 per cent. discount. American Plate ranges in price from 50 and 10 and 7½ per cent. discount to 60 and 2½ per cent. discount. Imported Plate Glass, 60 per cent. discount to 60 and and 10 and 5 per cent. discount.

Trade Items.

THE HAZEN COMPANY of Cincinnati, Ohio, have sold their plant at Anderson, Ind., known as the Arrow Wire Nail Factory, to the Arrow Company. They, however, retain a controlling interest, and will continue their old, long-established business as Iron and Steel factors, representing 15 of the largest manufacturers of Iron and Steel in the country. They state that their object in forming the Arrow Company is to increase the manufacturing department. The Arrow Company has been incorporated under the laws of Indiana with a capital stock of $150,000. The officers of the company are as follows: Jno. F. Hazen, president; Geo. E. Day, treasurer, and William L. Finch, secretary and general manager of factory. These gentlemen, with Wm. P. Anderson and Walter H. Field, comprise the board of directors.

IN THE LATTER PART of November a sensational report appeared in some of the New York daily papers, to the effect that Schoverling, Daly & Gales, 302 Broadway, New York, had been systematically robbed of goods by an employee to the amount of about $25,000. The following day the firm corrected the report, stating that the articles taken amounted to 12 Revolvers, the value of which was about $100.

HIGGINS & VAN SYCKEL have just formed a partnership to do business as purchasing agents, with an office at 59 Beekman street, New York, their purpose being to buy Hardware, on commission or otherwise, for jobbing and leading retail Hardware houses in different parts of the country, more particularly West and South. They have secured the representation of some firms and are in a position to accept a few more. Henry G. Higgins, the senior partner, was for years with the Layman & Carey Company, Indianapolis, Ind., and later with Eldridge, Winnek & Irving, Boston, Mass. Lamar Van Syckel, the junior member, obtained his knowledge of Hardware in the employ of the Russell & Erwin Mfg. Company, New York.

A PROSPECTUS for 1893 is being sent out by the McIntosh-Huntington Company, Cleveland, Ohio, relating to the line of Bicycles which will be carried in stock by them, and to their policy of placing agencies in the hands of Hardware men wherever possible. Their line of Wheels include the Sunol, King and Queen of Scorchers, Road King and Road Queen, Crypto, Geared Ordinary and F. D. Safety; Hercules and Stella. They will also act as Western and Southern agents for Lamps and other sundries manufactured by Jos. Lucas & Son.

THE CLEVELAND RUBBER COMPANY have opened a store at 248 Race street, Cincinnati, for retail and jobbing purposes. W. G. Brown, who has been sales agent for several years, is manager.

BONNEY VISE & TOOL WORKS of Philadelphia have recently purchased the factory, machinery, tools and patents, covering the entire plant of the Philadelphia Lathe Dog Company, who manufactured the Indispensable Lathe Dog, drop-forged, from bar steel. The works are in full operation and can fill orders promptly.

THE ELECTRIC GAS LIGHTING COMPANY, Boston and Chicago, send out a circular showing 11 leading styles of Electric Gas Burners, in addition to which they manufacture a line of specialties in Housefurnishing Goods. These specialties include Wood and Iron Box Electric Bells, Annunciators and Burglar Alarms, Electro-Mechanical Gongs, Wood and Metal Pushes, pocket Galvanometers, the Samson Battery, &c. Their advertisement, which appears in this issue, will be of interest to the trade.

THE ADJUSTABLE SHELVING, manufactured by Raymond & Campbell, Middletown, Pa., in many forms and adapted to various lines of goods, is shown in their circular. The firm call attention to the fact that after placing their shelving in position or removing it there are no defaced walls, no plastering destroyed, nor shelving broken.

A. H. MILLIGAN, Stewart Building, New York, who is well and favorably known to the trade from his connection with Dunham, Carrigan & Hayden Company, will hereafter make a specialty of the compilation of catalogues, and his announcement in regard to this matter will be observed in another column. This is a line in which Mr. Milligan has had experience, and has, we are advised, special qualifications for it. The matter of the compilation of price-lists, catalogues, &c., with the multiplicity of goods which are now upon the market, is one requiring special skill and experience, and there are, doubtless, manufacturers and merchants who will be glad to avail themselves of Mr. Milligan's services.

IT HAS BEEN SUGGESTED that from the description of the Scattergood pay roll book, given in *The Iron Age*, December 1, the impression might be received that the book is only intended for use with a pay roll of 37 names. It is, in fact, adapted for use with any number of names, as many permanent sheets being used as may be necessary. Testimonials are given from concerns using this pay roll who employ from 200 to 350 hands.

THE DE WITT WIRE CLOTH COMPANY, at 32 Reade street, New York, had a narrow escape from total destruction, in connection with a fire which had its origin on the third or fourth floor of 30 Reade street, which was discovered at 4.40 a.m., December 6, the building No. 30, front and rear, being utterly wrecked, nothing but the front wall now standing. The De Witt Wire Cloth Company occupied the ground floor and two basements, their stock being badly damaged by water, but untouched by fire. At present they are unable to state their loss, as the water is still pouring in.

COVERT'S SADDLERY WORKS, Farmer, N. Y., are distributing a metallic end hanger, highly colored and striking in conception, which is used to call attention to their Triumph Snap. The Snap in question is shown in its various forms of open eye, round eye, round swivel eye, loop eye and loop swivel eye; an illustration of the spring used in these Snaps is also shown. The hangers are designed for free distribution to the trade, and will be forwarded by the above company, upon request, as long as the supply lasts. A *fac-simile* of the hanger constitutes their advertisement in this issue.

The Hardware Club of New York.

WE GIVE BELOW the names of persons who have been admitted to membership in the Hardware Club since the publication of the list in our issue November 17:

FRANKLIN ACKER,
Acker, Merrall & Condit,
New York.

ROWLAND D. ALLEN,
R. J. Allen, Son & Co.,
Philadelphia.

WILLIAM D. BANCKER,
American News Company,
New York.

T. ATTWATER BARNES,
Ellrich Hardware Mfg. Company,
Plantsville, Conn.

C. A. BAYNON,
Woolley, Baynon & Moore,
New York.

WILLIAM BISHOP,
P. & F. Corbin, New York.

EUGENE BISSELL, JR.,
Haydock & Bissell, New York.

SAMUEL S. BLOOD,
International News Company,
New York.

H. J. BRAINERD,
Payson Mfg. Company, New York.

WILLIAM J. BRUFF,
Hartley & Graham, New York.

WILLIAM J. CASSARD,
American Whip Company,
New York.

GEORGE H. CHATILLON,
John Chatillon & Sons, New York.

GEORGE HEWLETT CLOWES,
Randolph & Clowes,
Waterbury, Conn.

A. R. DUSTIN,
John Russell Cutlery Company,
New York.

PATRICK FARRELLY,
American News Company,
New York.

H. FREDERICK FRASSE,
Frasse & Co., New York.

A. H. FUNKE,
Hermann Boker & Co., New York.

JOHN H. GRAHAM,
John H. Graham & Co., New York.

J. OLIVER GRAHAM,
John H. Graham & Co., New York.

WILLIAM HENRY HAYS,
Iron City Tool Works,
Pittsburgh, Pa.

A. B. JENKINS,
71 John Street, New York.

S. WHITTLESEY JOHNSON,
American News Company,
New York.

CHARLES S. JOPP,
Winsted Edge Tool Works,
West Winsted, Conn.

MINOT C. KELLOGG,
Patterson Bros., New York.

L. KOHNS,
L. Straus & Sons, New York.

CHARLES S. LANDERS,
Landers, Frary & Clark,
New Britain, Conn.

PETER H. LEONARD,
76 Reade Street, New York.

GEORGE L. MCALPIN,
97 Reade Street, New York.

LOGAN C. MURRAY,
Tradesmen's National Bank,
New York.

ROBERT MURRAY,
24 Duane Street, New York.

W. T. NICHOLSON,
Nicholson File Company,
Providence, R. I.

GEORGE L. PEASE,
Boorum & Pease Company,
New York.

WILLIAM T. SMITH,
Smith, Lyon & Field, New York.

IRA W. STEWARD,
Mercantile Benefit Association,
New York.

WILLIAM R. WHITEHEAD,
Swan, Whitehead & Clark,
Trenton, N. J.

CHARLES KNIGHT WILLMER,
American News Company,
New York.

The Club are actively making preparations for a trade dinner, which will probably be held in the latter part of February next. The matter is in charge of the following committee:

A. D. CLINCH,
PETER MCCARTEE,
E. C. VAN GLAHN,
EUGENE BISSELL,
J. L. VARICK.

Duty on Imported Fire Arms.

DECISIONS have recently been rendered by appraisers embracing interesting features in the importation of guns. In one case the goods were invoiced as one breech-loading shotgun, complete, costing about £100, with an extra pair of barrels, costing about £30, the values of the complete gun and of the extra pair of barrels being separately stated on the invoice. Duty was assessed upon the gun at $6 and 35 per cent., and upon the extra pair of barrels at 45 per cent. It was claimed by the parties to whom the goods were shipped that the two sets of barrels were fitted for the one stock, that the extra pair was a part of the gun and that the whole was dutiable as an entirety at $6 and 35 per cent. It was decided by the appraiser that the extra pair of barrels was not a necessary adjunct to the gun, that the gun was complete without such addition, and that the tariff provision for a gun was not intended to, and did not, cover a gun and a half.

In another instance the goods under consideration were single barrels for shotguns, rough-bored. They were assessed at 45 per cent., but it was claimed by the consignees that they were exempt from duty. The bore was smooth and bright, but experts testified that the boring machines now in use leave the surface in this condition, and that the bore would have to be subjected to several processes before it was finished, and that the barrels in the present condition are known as rough-bored. The outer surface of rough-bored barrels is usually on one plane from muzzle to breech, but in this case a cut by a turning lathe had been taken off the barrel near the breech. This work, however, was not considered significant in cost or character, and the decision reached was that the goods were shotgun barrels, forged and rough-bored, and as such were admitted free of duty.

A question has been argued in the United States Supreme Court whether the several parts of a complete article may be imported under separate invoices by different persons in order to be admitted to entry at a lower duty than is levied upon the article when imported entire. The case under discussion concerned an invoice of a number of finished gun stocks, with locks and mountings complete, ready for attachment to the barrels, which were separately invoiced and arrived by another shipment. They were assessed at the rate of 35 per cent. ad valorem, and a specific duty of $1.50 each. The importers protested to the Board of General Appraisers upon the ground that a gun stock, whether complete or incomplete, is not a fire arm, and cannot therefore be classified as a gun, either breech or muzzle loading; that the stocks were simply parts of guns and should be assessed as manufactures in part of steel at 45 per cent. ad valorem. The Board of General Appraisers decided that if the importation in question was simply one of gun stocks without the gun barrels required to make a complete fire arm and the case rested there, the articles could not be regarded as completed guns so as to justify their classification as such. Parts of guns, it was admitted, are not completed guns any more than parts of musical instruments are completed musical instruments, and the latter proposition has been decided negatively by the Supreme Court of the United States and many times reaffirmed by the Board of General Appraisers.

In the testimony it was disclosed that the firm importing the stocks had an agreement with a second firm, of which one of the partners was also a member, by which they were to order the barrels for the stocks with the mutual expectation that the stocks and barrels were to be put together after arrival at New York so as to make complete guns. In the opinion of the Board of General Appraisers the question was: "Is it permissible for two firms having a common partner interested in each to collude together separately to import the stocks and barrels of guns with the understanding that the parts shall be put together after arrival so as to make completed guns, and this done for the manifest purpose of getting the merchandise at a less rate of duty." The Board of General Appraisers held that such a mode of evading the payment of duties could not safely be tolerated and sustained the action of the Collector. The importers appealed to the Circuit Court of the United States, and Judge Lacombe reversed the decision of the Board of General Appraisers. The

United States appealed from this decision and the case is to be decided later.

Export Notes.

THE QUARANTINE against New York at Martinique was raised October 27.

The Treasury Department at Washington has authorized an allowance of drawback on exported Steel Pens manufactured by the Esterbrook Steel Pen Company, Camden, N. J., from imported Sheet Steel; also on exported petroleum barrels manufactured in New York City, and bound with hoops made of imported Hoop Steel.

Because of the threatened imposition of a heavy import tax on petroleum after January 1, 1893, a great rush is being made among exporters of that product from Philadelphia by both sail and steam vessels, in order that such cargoes may reach France or clear the Custom House before New Year's day.

The steamship "Alert," the pioneer vessel of the new Columbia Commercial Steamship Company, has been wrecked at the mouth of the Magdalena River near the port of Boca de Ceniza, in the United States of Colombia. The passengers and crew escaped in small boats, and with prompt assistance the cargo may be saved. She cleared from New York October 30, with a heavy cargo of merchandise, bound for Santa Marta and Carthagena. She had made her ports, discharged her cargo, and picked up a large return cargo from various cities, including 300 bags of coffee valued at $8000, about $2000 worth of freight consigned to W. R. Grace & Co., New York, and other valuable merchandise.

G. Ph. Nieder, in announcing the death of his brother, C. W. Nieder, on the 19th ult., who for some years carried on an export and import trade at 25 William street, New York, calls the attention of manufacturers and others to the fact that he has established a similar business at the same address, which he assures those interested will be conducted on the same strict principles with which he has managed his deceased brother's business for the past five years.

Catalogue of the American Screw Company.

AMERICAN SCREW COMPANY, Providence, R. I., issue a catalogue of more artistic merit than is usually found in Hardware literature. The cover is artistically ornamented with their name and trade-mark in gold and red, while the printing and paper are of corresponding excellence. Full-page engravings show their Eagle, Bay State and New England Mills, all of which are at Providence; also the mills of the Canada Screw Company, Hamilton, Ont., and of the British Screw Company, Leeds, England. These are followed by two pages of illustrations showing the medals received by the company from 1841 to 1891 inclusive. Cuts are given of the progress in manufacturing Wood Screws, following the improvements, from the blunt-point Screw formerly made in England to the patent Wood Screws of to-day, with standard heads. Price-lists are given of Iron and Brass Wood Screws; Nickel Plated Iron, and Nickel-Plated Brass Wood Screws, Iron Wood Screws for export, Iron Machine Screws, Brass Machine Screws, Machine Screw Taps, Machine Screw Tapped Nuts, Side Knob and Cap Screws, Stove Bolts, Pointed Wires, Fluted Tire Bolts, Rivets, Gimlet-Pointed Coach Screws, Hand-Rail Screws, Wire Nails, &c. Additional illustrations show the machines, processes and products by cold forging, owned by the company, also how a Wood Screw thread is developed by the Rogers cold-forging process. A picture is given of William G. Angell, who became manager of the Eagle Company at their formation in 1828, with a history of his connection with the Screw business to the time of his death in 1870. His son, Edwin Gorham Angell, succeeded his father as president and manager of the American Screw Company and is now acting in that capacity. The catalogue is complete in all the details relating to the Screw industry, and will, doubtless, be highly prized by the trade.

Hardware in New Zealand.

LETTER FROM POLHEMUS LYON.

Our Special Foreign Representative.

AUCKLAND, NEW ZEALAND, November 5, 1892.

To The Iron Age:

Our American wholesale Hardware merchant has a very simple problem compared with the Australian jobber. With us quite a fair proportion of merchandise is sold before it comes into stock, and the usual terms being 60 days with a liberal inducement for prompt cash, it is true, I believe, that the jobbers' receipts will average much inside of 90 days from date of invoice.

From what I have learned of foreign methods I should say emphatically that American business is not done on credit. Note the contrast. In England the manufacturer and wholesale merchant gives usually four months and often six months to local trade, who buy for their monthly needs, and either obtain 2½ per cent. discount for 30 days cash or give note as above.

The colonial buyer, having to order many lines six to eight months before he can get delivery, has therefore to carry a stock out of all proportion to amount of sales; his purchases, whether American or European, are usually drawn for by the shipper at 90 days' sight, so that they hardly get into stock before draft becomes due, while the colonial country trade are sold on four months' or six months' time; though as these accounts are settled for by "bills," or, as we call them, notes, the retail buyer does not carry much of a burden about meeting the engagement.

Almost all the Australian Hardware jobbers will inventory over $400,000, and a few more than three times this, so that financing, where buying and selling are conducted on such terms as above, is indeed no small feature of a successful business. Some of the houses do this in London, where money is cheap, remitting to their "home" office their receipts; but the colonial banks are very accommodating, profiting largely in consequence. The merchant of fair repute gets a very liberal credit at his bank, drawing checks against it and paying 8 per cent. on the actual amount of overdraft from day to day.

I am told that the majority of colonial bank accounts are overdraft rather than deposit. I know a Hardware firm who have an overdraft of $300,000 with one bank, this, of course, being independent of customers' notes, which are treated separately under discount and charged at a rate of 7 per cent.

It can readily be seen how advantageous terms are to these importers, and English manufacturers, instead of making a concession in price, are offering advantages in terms, drawing at four months' and six months' sight (the latter being hardly bankable), it taking an additional 80 days for the draft to be returned satisfied.

I find in competition that terms are more potent than an extra 2½ or 5 per cent., and certainly are cheaper to the seller.

Since money has grown so much cheaper with us, here is where the American manufacturer desirous of extending foreign trade can score a point or two with safety. There is no question that the colonials are interested to extend American purchases and will treat most kindly any overtures showing advantages in price or terms, for as a rule American lines yield a better profit and sell more readily than the more staple goods from Europe.

POLHEMUS LYON.

Failure of the Joliet Enterprise Company.

LOW PRICES and dull trade are alleged as the causes of the failure of the Joliet Enterprise Company of Joliet, Ill., which occurred on November 30. George H. Monroe was appointed receiver and will wind up the affairs of the company. The indebtedness is estimated at $1,000,000 and the assets at something over $400,000, depending, of course, on the amount which may be realized from the sale of the plant. On the day of the failure attachments were filed against the company as follows: Henry Fish & Sons, $176,420; Illinois Steel Company, $168,275; Cleveland Rolling Mill Company, $17,564; Bates Machine Company, $9100; Lambert & Bishop Wire Fence Company, $5753; Naylor & Co., $2750; Christian Correll, $3000; Raible Bros., $1954; H. B. Schuler, $1000; Chicago, Rock Island & Pacific Railway Company, $750. A trust deed to C. J. Blair of Chicago for $136,000, covering the entire plant and taking in a number of mercantile firms as preferred creditors, was placed

on record early in the day, prior to the attachments.

Seven-tenths of the stock of the Joliet Enterprise Company belonged to Henry Fish & Sons, owners of the Stone City Bank, who also assigned on the same day to James L. O'Donnell. The bank had been financiering for the benefit of the Joliet Enterprise Company, and the affairs of the two concerns were thus so inter woven that the failure of one meant the collapse of the other. For some time the bank has been offering 6 and 7 per cent. interest on deposits, raising money in that way which has gone largely into the works.

The Joliet Enterprise Company have been prominently connected with the Barb Wire trade for a number of years. Their works were burned during 1891, and when the managers decided to rebuild, they selected a site outside of the city of Joliet and proceeded to erect a much larger and finer plant, which was completed during the past summer. Very handsome and substantial brick buildings were put up and stocked with machinery for drawing Wire and manufacturing Barb Wire and Wire Nails. The ambition of the company was to make this plant rank among the largest Wire mills in the world. They unfortunately struck an unpropitious time for successfully carrying out such a project, and were unable to market their products as rapidly as finished. A huge warehouse, 400 x 420 feet, is reported to be stocked with Plain and Barb Wire awaiting a revival in trade which was confidently expected throughout the fall months, but persistently refused to materialize. Now that the company have failed there would seem to be some danger that this stock might be thrown upon the market and seriously depress the price of Wire, but other manufacturers stand ready to take care of it and avert such a result. The plant is so new and so well built and equipped that it will hardly lie idle for any length of time if it should be put up for sale.

Aluminum Cooking Utensils.

THE TRADE are awaiting with some interest definite information in regard to the line of Aluminum Cooking Utensils, announced by the Illinois Pure Aluminum Company. Their prospectus refers to the advantages which Aluminum possesses for such purposes. Their factory is, however, not completed and the goods have not yet, we understand, been put upon the market. When they are offered the trade will doubtless be disposed to give them a trial, and if the price is not too great, it would seem probable that they will meet with a good sale if in practical use they are found to possess the qualities claimed for them.

THE PHILADELPHIA DECORATIVE GLASS COMPANY have commenced operations in the building 2321 Vine street, fully equipped to execute orders promptly in Etching, Chipping and Embossing. Glass Signs and Advertising Novelties a specialty. They have special rubber-cushioned machines for evenly grinding small or large plates by the sand-blast process.

Banquet for Traveling Men.

AN ELABORATE BANQUET was enjoyed at Des Moines, Iowa, on December 2, by the Traveling Men's Association of Iowa, a large number of guests, both gentlemen and ladies, being present. Over the door of the banquet hall was the motto, "If you don't see what you want, ask for it." The address of welcome was by A. B. Cummins, who spoke as follows:

The people of Des Moines have given me a most agreeable commission to execute. It is to express their appreciation of the high character of your association, of the vast importance of the work in which its members are engaged, and the pleasure they feel in the opportunity of extending to you their hospitality. We have been sometimes accused of apathy in the performance of our duties as hosts of the great number of people who annually convene in our city. The criticism is just, and I congratulate you upon being able to revive a better conception of our obligations to strangers who gather within our gates. Ministers of all denominations and persuasions come and go, and we permit them to take care of themselves. Physicians hold their conventions and pursue their delightful and interesting discussions in peace. Politicians may crowd our hotels and elbow us from the sidewalk, and we do nothing more than pray for speedy deliverance. But when you appear our apathy disappears, our arms and our homes are open for your reception; whatever we have is yours.

We greet you with unfeigned pleasure. We shall say farewell with profound regret. You have captured us socially as completely as you captured the world commercially. We want to fill the order books of your social lives with the memoranda of pleasant memories, so that from time to time you can send us from over the hills, mountains and prairies kind recollections of this occasion. We want to impress upon you the fact that Des Moines occupies among its sister cities the same front rank that your association does among the various bodies of like character. . . . Allow me to hope that the success which has attended you in the past is simply the sunrise of a splendid day, upon which the shadows of evening will never fall. I will consume no more of an hour to be devoted to more stimulating pleasure than speech-making, but I must be permitted to add that to-night a familiar notice decorates everything we have—"If you don't see what you want, ask for it."

A letter of congratulation and good wishes from the Mayor of the city was read, after which followed an address by C. E. Stubbs of Fairfield, Iowa, who is a well-known Knight of the Grip. His subject was, "Our Association and Its Members." From his address we make the following extracts:

Surrounded as I am by so many "Knights of the Grip" renders the last part of my subject somewhat delicate, for to tell your many virtues might at this time seem immodest and to dwell upon your faults would forever forfeit friendship. The members of this association have an important part to play in the mercantile pursuits of this country. They are the prime factor in the mighty struggle that is being waged for trade. They are the retailers' comfort and the jobbers' hope. Their keen eyes scan every avenue of business, and their indomitable courage places the goods they sell on the shelves of every merchant in the land. They work their territories in the snow-storm and the rain, and the hope that springs eternal in their breasts pictures to them a brighter future.

They look at life from the standpoint of a philosopher. As a rule they do not believe that, during the last year of their existence they will be able to enjoy as many of life's blessings as though they commenced earlier, so they take their comforts when it is possible as they go along. In most cases we find the traveling men with cultivated tastes, and for them the best is none too good. If there is a Pullman car on their train they ride in it like a lord, yet if nothing but an engine goes their way they "get there" just the same.

To the traveling men of to-day life is a diversity as great as the fleeting changes of the kaleidoscope. They study human nature as a poet does his verses. To them the beauties of the world are never lost, and they have learned the art of associating pleasure with their business. It is true that "there are moments when they want to be alone," but they banish disappointment as a maiden would her blushes, and the smile with which they greet their customers, after a long drive through a snow-storm, is hard to imitate. Their patience is drilled in the most rigid school of experience, and they see their day's arrangements blasted with unparalleled composure.

DARK SIDE OF THE "KNIGHT'S" LIFE.

I would not have you draw from my remarks the conclusion that I regard the traveling man's life as an easy one. Their paths are not all roses, and they probably get as little credit from the world for what they undergo as any other class of men. They bear with the proud man's contumely and are the pioneers that find a market for all new articles and inventions. This requires energy, courage and integrity. There are certain qualifications they must have and in the truly successful traveling men these are congenital. Have you ever studied the traveling men of this country as a great aggregation of men, considered the important part they play in the intricate machinery of commerce and taken an impartial view of their trials and hardships? Do so, and you will wonder how they can have such even tempers. To be sure they frown upon a tough beefsteak, but that is a privilege accorded every man, and if they smile upon a tender one society should overlook the fault.

The traveling men are obliging and generous. They see life in all its phases and pity is their constant companion. When they have a town to make, even the thought of eating lunch counter sandwiches on the way cannot deter them, and they accept the inevitable with a grace that well becomes a man. The "drummer" must be called at all hours of the night, and when he stops at a country hotel often retires to shiver in a room where the mercury stands at zero. He leaves his call for 3 o'clock, and at the first rap on his chamber door arouses himself and pulls the icicles from his mustache. With the courage of a Cæsar he breaks the ice in his water pitcher and completes his morning's toilet in a better frame of mind than most men could be. Affable as he is, one would hardly expect him to wear his smile when he finds, on reaching the depot, that the train he has gotten up to take is reported three hours late. He resigns himself to his fate, but thinks often of the night clerk who got him out of bed.

TESTED BY A SEVERE STANDARD.

In my opinion no men are tested by a severer standard. I have even seen them smile when side-tracked on a way freight. They are as familiar with the time cards as though they owned the railroads, and if they ever miss a train it's no fault of their own. They read the countenances of their own customers as accurately as a mariner does his signals and know which ones a story will induce to buy a bill of goods. They have carefully studied their

parts in the great drama of life and it has broadened their ideas and made them liberal in their views.

In conclusion, let me say that the cause for which you have labored is a meritorious one, and it is my hope that when we meet to celebrate another epoch in our organization's history we may be permitted to view the year upon which we are just entering as the brightest page in the history of the Traveling Men's Association.

Mr. Stubbs was followed by ex-Governor Irwin of Keokuk, who, though not a traveling man, is known as one of their best friends. He spoke about traveling men, past and present, as follows:

The traveling man, technically so-called, occupies a different position to-day from that of his predecessor of 100 years ago. Then he was looked upon as an evil, a necessary one, perhaps, but still an evil. To the salesman on the road of that day and to his standing in the eyes of the world at large might well have been applied the words the genius of Shakespeare put in the mouth of Shylock when speaking of the Jew of his time and generation: "Has not the Jew eyes? Hath not a Jew hands, organs, dimensions, senses, affections, passions? Fed with the same food, hurt with the same weapons, subject to the same diseases, healed by the same means, warmed and cooled by the same winter and summer as the Christian is. If you prick us do we not bleed; if you tickle us do we not laugh; if you poison us do we not die?"

In other words, the traveling salesman of that time was a man like other men, but the world refused him recognition as such and placed him wrongfully—like Dundreary's bird—in a flock "by himself;" said that he was a liar and a drunkard; that he cheated his customers, that he swindled his employers, that he beat the railroads, that he was a habitué of saloons and gambling houses, and that, like an old-time sailor, he had a different name in every hotel and a new wife at every port. . . .

A house, I think, is always glad to pay a man all that he is fairly worth, and a house is usually as good a judge of a man's capacity as he is himself. He is not necessarily the best salesman who sells the most goods—he is the best salesman who preserves the relation of buyer and seller by mutual confidence. He is the best salesman, who, in all cases and everywhere preserves his own self-respect. He cannot be a rogue and trifler and do that. Loyalty—absolute but reasoning loyalty—is requisite, and when this loyalty is freely and frankly given, I think you will find that loyalty is given to you in return. When you reflect that your houses must and do live up to the spirit and letter of their agreements with you and that you can or not as you please keep the spirit and letter of your contract with the house, you must see how much the matter is in your hands and how entire the confidence placed in you.

When you reflect upon the narrow margin that stands to the jobber between a profit and a loss, and when you know that a net profit of 4 per cent. on sales is about the best the jobbers of the country can do, and that narrow margin between success and failure is almost in your hands, you must believe and appreciate the generous confidence that invested capital places in your energies, your abilities, and your high sense of business honor. . .

It has grown into a custom born of ignorance and prejudice and malice to speak flippantly of the traveling man, the drummer and his work. Let those who indulge in this remember that it is the husband and father who works for the wife and little ones. That he is a bread-winner and that his work is honest, honorable, and requires much.

The banquet and speeches were followed by a ball, and on the next day the annual business meeting of the association was held in the Grand Opera House.

Exports.

THE FOLLOWING are the exports of Hardware, Machinery, Metals and related goods from the port of New York to foreign countries for the week ended November 26, 1892. The items for Canada and Mexico include merchandise by seagoing vessels only; that by rail not being given. The totals following each port or country represent *everything* except specie:

ARGENTINE REPUBLIC.—Total, $164,935

Machinery	4,318	Manufactured Wood	52
Hose	22	Cutlery	114
Wheels	28	Manufactured Iron	453
Axles	90	Lamp Goods	1,905
Electrical Material	809	Plated Ware	2,334
Scoops	168	Grindstone Fixtures	70
Scales	27	Manufactured Copper	140
Silverware	510	Sewing Machines	550
Belting	11	Cartridges	445
Needles	275	Sandpaper	57
Twine	557	Carriage Material	125
Agricultural Implements	95,087		
Hardware	1,090		
Iron	8		

AMSTERDAM.—Total, $7,261

Lamp Goods	121	Organs	82
Machinery	935	Hardware	414
Pumps	93		

AVONMOUTH.—Total, $45,540

AYR.—Total, $100

ANTWERP.—Total, $339,705

Rubber	300	Cake Molds	30
Hardware	465	Iron Drums	30
Organs	175	German Silver	44
Electrical Material	309	Agricultural Implements	15
Plated Ware	250	Woodware	25
Manufactured Rubber	300	Manufactured Iron	200
Carpet Sweepers	25	Machinery	557
Typewriters	35	Brake Equip	1,420

AZORES.—Total, $2,761

Hardware	49	Tinfoil	7

ADEN.—Total, $2,300

AFRICA.—Total, $936

Lamp Goods	55	Hardware	176
Sewing Machines	36	Clocks	35
Brass Goods	44	Nails	8
Woodware	1	Organ	50
Trunks	13		

ALEXANDRIA.

Agricultural Implements	15

BORDEAUX.—Total, $135,790

Pumps	220

BRAZIL.—Total, $73,711

Manufactured Iron	795	Pins	23
Lamp Goods	693	Iron Tank	66
Machinery	52	Scales	41
Cutlery	932	Hardware	987
Cartridges	630	Manufactured Wood	142
India Rubber Goods	92	Fish Lines	78
Twine	1,322	Trunks	43
Sandpaper	2	Sewing Machines	2,035
Telegraph Material	400	Clocks	207
Crucibles	10	Wire Goods	9
Nails	193	Woodware	16
Fire Arms	740	Agricultural Implements	8
Tin	98	Trunk Material	99
Nails	18	Sewing-Machine Fixtures	14
Twine	271	Tacks	11

BERLIN.—Total, $3,066

India Rubber Goods	103	Typewriters	1,235
		Hardware	175

BOLIVIA.—Total, $285

BREMEN.—Total, $219,446

Optical Instruments	85	Electrical Material	115
Manufactured Iron	942	India Rubber Goods	75
Typewriters	1,695	India Rubber	7,500
Hardware	2,438	Organ	56
Cash Registers	300	Glue	110
Manufactured Wood	460	Sandpaper	40
Machinery	4,289	Mineral	73

BRITISH GUIANA.—Total, $46,739

Woodware	117	Scales	18
Lamp Goods	79	Hardware	25
Clocks	47	Traveling Bags	70
Manufactured Wood	8	Roofing	660
Cash Registers	100	Tinware	8
Electrical Material	410	Wringers	5
		Machinery	110
		Sewing Machines	126

BRITISH WEST INDIES.—Total, $187,868

Hardware	432	Sandpaper	21
Manufactured Iron	303	Plated Ware	31
Lamp Goods	447	Pig Iron	109
Sewing Machines	6	Tacks	3
Hose	22	Manufactured Wood	21
Agricultural Implements	166	Electric Material	39
Scales	77	Tinware	239
Woodware	237	Carriage Material	233
Nails	393	Wagon Material	24
India Rubber Goods	131	Building Material	70
Nails	14	Yellow Metal	110
Nails	35	Grindstone	5
Brushes	30	Carriages	1,450
Refrigerators	22	Typewriters	185
Velocipede	5	Roofing Slate	108
Pumps	19	Wheels	30
Organs	271	Machinery	342
Twine	5	Fish Lines	35
Ice-Cream Freezers	2	Fuse	637
Surveying Instruments	23	Percussion Caps	203
Powder	3,967	Trucks	5
Hoops	14	Clocks	15
Trunks	170	Saws	69
		Iron	14
		Car Material	48

BELFAST.—Total, $2,640

Machinery	125

BARCELONA.—Total, $523

BREMERHAVEN.— Total, $9,240

AUSTRALIA.—Total, $32,439

Plated Ware	334	Saws	222
Machinery	800	Hardware	891

BRITISH EAST INDIES.—Total, $7,768

Lamp Goods	505	Gun Primers	199
Clocks	1,382	Electrical Material	248
Hardware	530	Nails	15
Manufactured Iron	10	Machinery	108
Sewing Machines	270		

BRITISH POSSESSIONS IN AFRICA. Total ..... $22,750.

Machinery	2,976	Cartridges	1,658
Plated Ware	250	Manufactured Wood	4
Iron Safes	300	Hardware	22
Clocks	39		

BRISTOL. Total, $209,897.

Zinc Ashes	100

CHINA. Total, $2,574.

School Appliances	2,310

CHRISTIANIA.—Total, $47,215.

CHRISTIANSAND.—Total, $125.

CONSTANTINOPLE.

Lamp Goods	$75

CONSTANCE.

Hardware	$288

CUBA.—Total, $342,178.

Manufactured Iron	13,420	Hardware	4,494
Lamp Goods	405	Grindstone Fixtures	19
Machinery	35,076	Manufactured Wood	429
Electric Material	489	Railroad Material	3,231
Twine	124	Iron Wheels	153
Tinware	423	Hand Carts	15
Boiler Material	9,024	Iron Pipe	5,852
Nails	1,538	Iron Safes	554
Saws	63	Trunk Material	650
Valves	594	Emery Cloth	63
Brushes	221	Scales	959
Freezers	40	Refrigerators	95
Clocks	273	Platform Cars	2 820
Locomotives	35,801	Boiler Tubes	1,072
Locomotive Parts	296	Packing	260
Cutlery	1,173	Fish Plates	1,390
Spikes	908	Hoops	267
Rails	3,706	India Rubber Goods	1,933
Wheels and Axles	2,700	Wheelbarrows	12
Lubricators	9	Typewriters	95
Pumps	226	Cars	365
Sugar Wagons	3,175	Blower	150
TypewriterStand	11	Nails	91
Brake Fixtures	10	Tel. Fixtures	3,146
Iron	2,000	Sewing Machines	125
Powder	17	Coal	368
R. Blocks	1,150	Trucks	199
Zinc	91	Steel Shaft	300
Pig Iron	165	Grindstones	38
Agricultural Implements	6	Pins	97
Carriage Material	24	Whistles	32
Manufactured Copper	546	Brass Goods	333
Bushings	32	Needles	27
Iron	24	Woodware	16
Velocipedes	88	Glue	298
Manufactured Steel	32	Tinfoil	20
		Carriage	500
		Wire Goods	14

CHILI.—Total, $15,213.

Woodware	23	Plated Ware	361
Hardware	340	Carriage	200
Agricultural Implements	1,300	Machinery	3,031
		Nails	2,960

COLOGNE.—Total, $277.

CENTRAL AMERICA.—Total, $1,836.

Quicksilver	3,100	Hardware	9
Nails	127	Manufactured Iron	119
Machinery	736	Lamp Goods	6
Agricultural Implements	25	Sewing Machines	171
Wire Goods	14	Grindstones	7

CANADA.—Total, $23,845.

COPENHAGEN.—Total, $42,743.

DEPTFORD.—Total, $38,800.

DRONTHEIM.—Total, $860.

DANZIC.—Total, $578.

DUTCH EAST INDIES.—Total, $1,194.

Pumps	335	Wheels	16
Carriages	377	India Rubber Goods	98
Shears	195		

DUTCH GUIANA.—Total, $4,553.

India Rubber Goods	3	Lamp Goods	17

DUBLIN.—Total, $48,125.

Shade Rollers	287	Pumps	50
Manufactured Wood	176	Hardware	260
Agricultural Implements	360	Whetstones	26
Razor Strops	10	Manufactured Iron	10

DANISH WEST INDIES.—Total, $8,753.

Hardware	7	India Rubber Goods	60
Manufactured Iron	99	Manufactured Wood	103
Tank	675		

DUTCH WEST INDIES.—Total, $487.

Hardware $1

DOVER.—Total, $114,179.

DRESDEN.—Total, $143.

DENTON.

Sandpaper $765

DUNDEE.—Total, $14,786.

ECUADOR.—Total, $909.

India Rubber Goods	150	Velocipedes	35
Bell Fixtures	41	Trunks	10

ELISABETGRAD.

Agricultural Implements $455.

EMDEN.—Total, $35.

ERFURT.—Total, $900.

Glue $450

FLORENCE.—Total, $500.

FRANKFORT.—Total, $2,499.

Tacks 834

FRENCH WEST INDIES.—Total, $163.

GLASGOW.—Total, $303,695.

Coal	3	Belting	420
Sewing Machines	362	Sleigh	120
Hardware	71	Optical Instruments	50
Tin	5	Clocks	275
Organs	400	Agricultural Implements	5
Handle Stuff	300	Woodware	275
Machinery	2,605		
Manufactured Wood	669		

GENOA.—Total, $11,490.

India Rubber Goods	3,094	Hardware	161

GOTTENBURG.—Total, $5,477.

GOEPPINGEN.

Hardware $150

HUY.

Rings $82

HONG KONG.—Total, $441.

HAYTI.—Total, $147,972.

Manufactured Wood	258	India Rubber Goods	21
Nails	280	Wheels and Axles	35
Woodware	28	Scales	93
Iron Safe	150	Tinware	21
Agricultural Implements	13	Belting	48
Trunks	41	Trunk Material	8
Brass Goods	8	Tin Plate	64
Nails	7	Sewing Machines	40
Hose	13	Wheelbarrow	7
Twine	64	Glue	10
Cotton Lines	42	Machinery	420
Wire Goods	43	Clocks	8
Hardware	730	Electrical Material	261
Manufactured Iron	406	Carriages	660
Lamp Goods	295	Store Trucks	16
Sheet Tin	277	Iron Bars	10

HAVRE.—Total, $140,596.

Machinery	1,044	Manufactured Iron	70
Copper	142	Cutlery	90
Sewing Machines	300	Carpet Sweepers	110
Copper Matte	12,313	Electrical Material	210
Metal Thread	1,400	Sandpaper	100
Manufactured Wood	16	Emery Wheels	300
Hardware	1,066		
Nickel Oxide	90		

HULL.—Total, $322,109.

Lamp Goods	975	Glue	139
Hardware	2,121	Manufactured Wood	1,338
Crucibles	30	Agricultural Implements	339
Clocks	3	Manufactured Iron	110
Sandpaper	41		
Manufactured Wood	400		

HAMBURG.—Total, $679,910.

India Rubber	3,300	Scales	31
Manufactured Iron	307	Wheels	257
Machinery	4,297	Whetstones	27
Plated Ware	757	Nails	28
Cutlery	480	Cartridges	96
India Rubber Goods	150	Hardware	7,126
Electrical Material	500	Manufactured Wood	995
Sewing Machines	13,995	Silverware	500
Manufactured Copper	17	Firearms	765
Surgical Goods	250	Britannia Ware	473
Washing Machines	50	Organs	900
Wringers	102	Nails	25
Hand Cars	450	Freezers	280
Nickel Oxide	830	Velocipedes	22
Sash Cord	15	Carpet Sweepers	90
Brushes	9	Wagons	350
		Nickel	300
		Clocks	4
		Wagons	620
		Razor Strops	18

JAPAN.—Total, $61,297.

Stove Polish	18	Mica	120

KONIGSBERG.—Total, $23,789.

LEICESTER.—Total, $247.

Sandpaper $182

LILLE.

India Rubber Goods $140

LUBECK.

Maizena $242

LIBERIA.—Total, $928.

Woodware	6	Manufactured Wood	30
Hardware	30		

LISBON.—$131,222.

Crucibles	74	Clocks	641
Hardware	8	Britannia Ware	194

LEGHORN.—Total, $116,272.

Machinery 300

LONDON.—Total, $879,937.

Firearms	2,817	Sewing Machines	7,791
Hardware	12,879	Iron Safes	555
Cash Registers	140	India Rubber Goods	228
Trunks	43	Typewriters	7,314
Bell	50	Organs	1,485
Manufactured Iron	155	Woodware	4,394
Agricultural Implements	1,089	Electric Material	3,643
Manufactured Wood	8,287	Cartridge Shells	27
Whetstones	1,055	C. box stock	273
Carpet Sweepers	15	Brushes	13
Machinery	9,371	Shells	5,602
Cartridges	514	Wringers	822
Lamp Goods	100	Belting	642
Carbons	100	Water Meters	43
Lead	14,600	Carbon	7,520
Cutlery	500	Needles	95
Store Trucks	180	Scales	166
Emery Wheels	88	Mica	300
		Refrigerator	38

LEIPSIC.—Total, $1,070.

LEITH.—Total, $79,322.

Manufactured Wood	40	Tanks	165

LIVERPOOL.—Total, $1,504,172.

India Rubber Scrap	500	M. Rollers	115
Brass Goods	31	Firearms	3,055
Hardware	3,035	Zinc Screw Tops	1,700
India Rubber Goods	760	Lamp Goods	456
Cutlery	75	Machinery	4,440
Electric Material	70	Ore	12,445
Tinware	15	Agricultural Implements	2,000
Manufactured Copper	200	Saws	40
Clocks	5,548	Organ Tops	50
Manufactured Wood	2,414	Celluloid	800
Organs	2,557	Sewing Machines	492
Copper matte	21,000	Wringers	8
Manufactured Iron	51	Emery Wheels	300
Calligraph Parts	800	Metal Goods	240
Razor Strops	11	Lamp Goods	160
Typewriters	40	Min. Fiber	204
Carriage Material	461	Carbon Black	600
		India Rubber	3,000
		Manufactured Iron	122

MOSS.—Total, $30,015.

MADRID.

Pumps $23

MEXICO.—Total, $29,229.

Manufactured Wood	117	Hose	16
Bicycles	450	Hardware	2,763
Tin	29	Manufactured Iron	6,714
Sharp Stones	10	Lamp Goods	199
Carriage Material	27	Sewing Machines	3,644
Scales	87	Pumps	160
Fire Arms	295	Tinware	15
Iron Pipe	26	Clocks	51
India Rubber Goods	25	Packing	6
Belting	70	Grindstones	5
Electrical Material	76	Nails	246
Percussion Caps	62	Nails	11
Agricultural Implements	70	Valves	68
Cartridges	137	Machinery	513
		Wire Goods	14
		Sandpaper	4
		Wheelbarrows	29

MANNHEIM.—Total, $171.

MAGDEBURG.—Total, $45.

MILAN.—Total, $1,590.

Sewing Machines 760

MOSCOW.—Total, $5,294.

Sewing Machines	3,100	Manufactured Iron	31
Machinery	1,768		
Scales	203		

MARSEILLES.—Total, $13,405.

NEW ZEALAND.—Total, $16,223.

Lamp Goods	438	Pumps	525

NANTES.—Total, $520.

NOVA SCOTIA.—Total, $4,288.

Sewing Machines	100	Fuse	100
Copper Ware	388	Telegraph Supplies	300
Coal	500		
Trunks	50		

NEWCASTLE.—Total, $112,050.

Manufactured Wood	1,611	Handspikes	50
Clocks	612	Stove Polish	650
		Woodware	440

NEWFOUNDLAND.—Total, $33,887.

Sewing Machines	214	Woodware	6
Plumbing Material	757	Iron Pipes	37
Twine	75	Hardware	618
Machinery	325	Wire Goods	79
India Rubber Goods	53	Agricultural Implements	97
Pumps	17	Manufactured Iron	310
Manufactured Steel	24	Clocks	32
Scales	34	Electrical Material	586

NEW BRUNSWICK.—Total, $13,482.

Coal 3,095

OPORTO.—Total, $107,190.

Hardware	139	Manufactured Iron	71
Pumps	50		
Clocks	260		

ODESSA.—Total, $1,447.

Scales	101	Agricultural Implements	46
Pumps	1,300		

PERU.—Total, $4,012.

Cutlery	621	Sewing Machines	24
Hardware	38	Belts	12

PORTO RICO.—Total, $1,392.

Agricultural Implements 27

PALERMO.—Total, $510.

PAISLEY.—Total, $116.

PHILIPPINES.—Total, $1,126.

Clocks	18	Britannia Ware	55
Hardware	8	Trunks	22

PRAGUE.—Total, $70.

QUEENSTOWN.—Total, $69

ROTTERDAM.—Total, $282,741.

Carriage Material	850	Carpet Sweepers	150
India Rubber Goods	1,450	Organs	450
Hardware	303	Manufactured Wood	469
Machinery	265	Agricultural Implements	72
Copper	12,935		

ROSTOFF.

Pumps $1,008

RIGA.—Total, $2,857.

SPANISH POSSESSIONS IN AFRICA.—Total $380.

SMYRNA. Total. $1,046.

SUNDERLAND.

Boiler Compound $49

SANTANDER.

Pumps $183

SLAVIANSK.

Pumps $40

ST. NAZAIRE.—Total, $180,

STOCKHOLM.—Total, $7,970.

STETTIN.—Total, $25,827.

SAMOAN ISLANDS.—Total, $302.

Hardware 132

SAN DOMINGO.—Total, $3,628.

Coal	354	Railroad Switches	69
Locomotive	2,700		

TRIESTE.—Total, $12,927.

TASMANIA.—Total, $550.

URUGUAY.—Total, $23,704.

Agricultural Implements	4,546	Firearms	93
Nails	265	Machinery	210
Samples	24	Lamp Goods	166
		Cartridges	103

UNITED STATES OF COLOMBIA.—Total, $1,641.

Hardware	63	Manufactured Iron	243
Machinery	216	Sewing Machines	438
Nails	3		

VIENNA.—Total, $592.

VENICE.—Total, $150.

VENEZUELA.—Total, $10,334.

Hardware	110	Manufactured Iron	2
Scales	53	Cutlery	118
Twine	56	Cages	13
Woodware	13		
Fishing Lines	97		

WATERFORD.

Carts $40

WALSALL.

Hardware $52

WIGAN.—Total, $510.

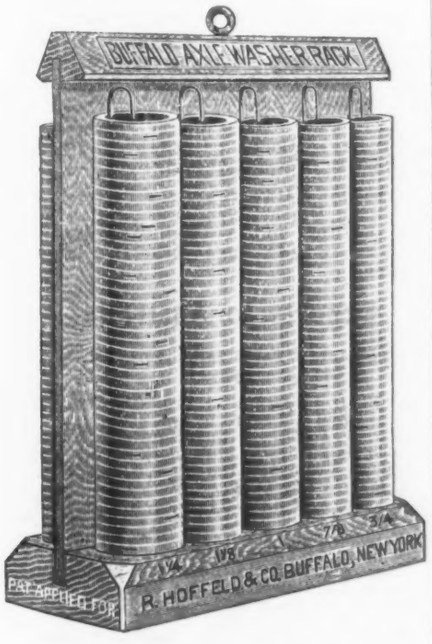
ZURICH.—Total, $390.

Typewriters 375

Grand total ..... $7,401,837.

Buffalo Axle-Washer Rack.

R. HOFFELD & CO., Buffalo, N. Y., are putting this article on the market, as illustrated herewith. The advantage of this rack consists in making a desirable display of the washers, and also enabling any axle to be conveniently fitted without looking over a number of boxes for the sizes wanted. The rack can be taken to the carriage with all the various sizes on it. It is arranged for sizes from ¾ to 1¼ inches, the Collar on one side and the Nut Washers on the other.



Buffalo Axle Washer Rack.

Inventory Methods.

RUBEL BROTHERS, 846–850 Dearborn street, Chicago, and 84 West Broadway, New York, are introducing a new labor saving system of taking inventories. The inventory sheet shown in Fig. 1 is 9½ x 12 inches in size and contains 31 lines. There is a column each provided for the quantity, description, price and extensions, also a check column. The sheets have a printed heading containing all the important items necessary, such as Department, Location, &c., also spaces to make the proper notations, such as date and by whom entered, called, price, extended, &c. These sheets are used in connection with a holder which will hold from 1 to 25 of them.

The inventories are taken on these sheets in the holder, Fig. 2, in the different departments and are filed in the binder, Fig. 1, which will hold 1500 of these sheets. The idea is that the inventory can be taken in different parts of the house at the same time and afterward condensed into one binder, or a binder for each department may be used, thereby saving the extra work of copying.

As soon as the clerk who enters the articles has finished one sheet it can be passed to another party to extend, thereby saving time as well as the liability of making mistakes in copying.

The holders are smooth inside and present a nice smooth surface for writing, and the sheets are printed on a bond paper perforated so as to fit the binder, tableted 125, 250, 500 or 1000 sheets. With these sheets the temporary holders and permanent binders are used, which are referred to as identically the same as those used in connection with the Page-McCleery system of handling orders, with which the wholesale trade is generally familiar. The inventory sheets, temporary holders and permanent binders are quoted as follows:

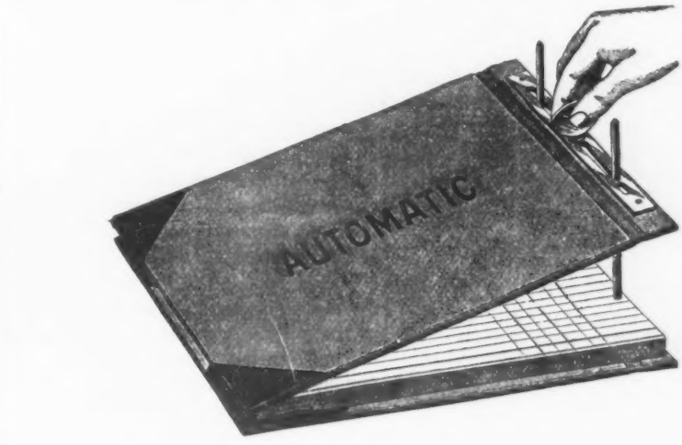


Fig. 1.—Inventory Sheets and Binder.

Fig. 2.—Inventory Holder.

125 Sheets, tableted	$1.50
250 Sheets, tableted	2.50
500 Sheets, tableted	4.00
1000 Sheets, tableted	7.00
Temporary Holders, each	1.25
Permanent Binders, each	2.50

Price-Lists, Circulars, &c.

THE LAW MFG. COMPANY, Toledo, Ohio: Steel Brick and Mortar Hods. Illustrations are shown of these Hods in various forms, suitable for mortar, putty, brick and stone; also Machine Hods for use on hoists. The Hods are made of one piece of cold rolled steel, with hardwood handles, and so constructed as to combine lightness, strength and durability.

WM. A. STOKES & CO., New York: House Furnishing Wooden Ware for domestic and export trade. Their illustrated catalogue for 1892–93 calls attention to the line of new goods which have been manufactured to meet the wants of those who desire first-class articles at reasonable prices. The line of goods shown are numerous, and consist of Step Ladders, Extension Ladders, Step Chairs, Broom Stands, Clothes Bars, Ironing Boards, Kitchen and Laundry Tables, Folding Tables, Towel Racks, Spice Cabinets, Foot Stools, Blacking Cases, Commodes, Cabinets, Hall Trees, Combination Toilet Cases, Ladies' Desks, Reclining and Hammock Chairs, Carpet Sweepers, Folding Curtain Stretchers, Tables, Extension Tables, Office Chairs, Desks, &c.

H. H. MAYHEW & CO., Shelburne Falls, Mass.: Hardware and Mechanics' Tools. Their illustrated price-list No. 6 contains illustrations of Black Handle Screw Drivers, Goodell's Automatic Interchangeable Screw Drivers, Tool Sets, Automatic Drills, Shoe Files, Black Handle Tack Claws, Mayhew's Double cut Bits, Mayhew's Double-cut Gimlets Hartwell Double-cut Bits, John Hartwell Double-cut Gimlets, German Pattern Diamond Bits, Diamond Countersink Bits, Pod Bits, Diamond Gimlets, Square Reamers, Countersinks, Kitchen Forks, Cake Turners, &c.

X. STOUTENBOROUGH, 270–272 Pearl street, New York: Culinary utensils for kitchen, restaurant and hotel use of Japanned and Plain Tin Ware, Plain and Retinned Stamped Ware, Hotel and Steamship Supplies, Sheet Iron Goods, Tinners' Trimmings, Tools and Machines, &c. . A feature of this business is the increasing demand for heavy well made ware for hotel and steamship use, which he is paying especial attention to, keeping a number of skilled workmen constantly employed on these goods, many of which are made to order. In his illustrated catalogue and price-list allusion is made to a patented article in the way of a Shell Pattern Crumb Pan and Brush, for which there is a good demand. His line also includes a great number of Toilet and Miscellaneous Articles for house and hotel furnishing.

THE ANDREW B. HENDRYX COMPANY, New Haven, Conn.: Fishing Reels. Their catalogue for the trade of 1893, containing 82 pages, is devoted almost entirely to illustrations. prices and descriptions of the Hendryx Reel. This is shown in a great variety of forms, made in aluminum, gold bronze, brass, nickel plated, silver, rubber, &c Illustrations and prices are also given of Gears, Steel Pinions and Handles, and Spring Brass Reel Clamps. In addition to these goods the company manufacture Bird Cages, Jack and Safety Chain and Picture Wire.

J. B. SHANNON & SONS: A special Cutlery catalogue of 24 pages, illustrated and descriptive of Pocket Knives, Razors, Razor Strops, Carving Knives and Forks, Table Steels, the Clauss Bread, Cake and Paring Knives, Butcher Knives and Steels, French Cooks' Knives, Table Knives and Forks, Scissors and Shears, Paring and Slicing Machines.

WILCOX HEAT-LIGHT COMPANY, South Bend, Ind., explain in their catalogue the working of the Heat Light. It consists of an arrangement of Lamp, burning either oil or gas, giving both light and heat; or it can be so operated as to pro-

duce either heat or light separately. Illustrations and descriptions of the different forms and styles in which these goods are made clearly set forth the advantages claimed for them.

THE JANESVILLE HAY TOOL COMPANY, Janesville, Wis.: Strickler's Reversible Dead Lock Hay Carriers, Boss Hay Carriers, Rod and Cable Carrier; Strickler's Dead Lock Swivel Carrier, Steel Track, &c. Their pamphlet illustrating and describing these goods is handsome in design and conveniently arranged.

THE BUHL STAMPING COMPANY, Detroit, Mich: Revised list No. 16, under date November 1, giving condensed price-list of Factory and Railroad Milk Cans and Dairy Can Supplies. In addition to these goods prominence is given to the Buhl Dash Reflector Lanterns and to their Tubular Head Light, for creameries,

SYRACUSE TWIST DRILL COMPANY, Syracuse, N. Y.: Metal Boring Drills, Wood Brace Drills, Wood Chuck Drills, Bell Hangers' and Electricians' Drills, Clark's Double-Cut Countersink, Adjustable Malleable Bit Holders, Balz Tool Holders, Drill Chucks and Extension Chucks, Screw-Driver Bits, Nail Sets, Bit Stock Drills for metals, Taper Length Drills for drill presses, &c. The different lines are designated by letters, which are used in ordering to avoid errors.

O. H. ROBERTSON, Forestville, Conn.: Chain-Hanging Cattle Stanchion. This is simple in construction, yet giving the animal perfect freedom to turn its head and lick its side, or to lie down and to get up with perfect ease. They provide for the animal neatness and comfort, and with proper conveniences add much to the cleanliness of the stable. The fact that over 50,000 of these Stanchions are in use proves their acceptability.

HIBBARD, SPENCER, BARTLETT & CO., Chicago, Ill.: 1892 fall circular of Guns, Rifles, Revolvers, Loaded Shells, Gun Implements, &c. Illustrations, list prices and descriptions of these goods are given, showing American, English and Belgian Guns, Rifles, Revolvers, Gun Implement Sets, Belts, Shell Boxes, Hunting Boots, Coats, &c , Pigeons and Traps, and a line of Rudolph's Sportsmen's Goods, including the Adjustable Cheek Protector.

OIL WELL SUPPLY COMPANY, Pittsburgh, Pa., New York and Bradford, Oil City, Pa.: Merchant Pipe, Tubing, Casing, Line and Drive Pipe. Their illustrated circular and price-list gives information relating to their line of manufactured goods, with tables of discount equivalents.

FISHER & NORRIS, Trenton, N. J.: Eagle Anvils. In a circular relating to these goods, the advantages of these Anvils are explained, and the statement made that all Eagle Anvils are now made with the latest Fisher Patent Double Thick Steel on both edges of the face the whole length. The standard dimensions of Eagle Anvils are given as made for blacksmiths, saw makers, chain makers, bit makers, axe makers, cutlers, file makers, razor makers, &c. The list price per pound on Anvils from 100 to 800 pounds has recently been made 9 cents instead of 10 cents as heretofore.

L. S. KELLOGG MFG. COMPANY, Racine, Wis.: A budget of circulars relating to the Rider Lightning Wrench, Success Bridle Bit, Combined Whip Socket and Rein Holder, Davis Safety Whiffletree Hook, Eveners, Neck Yokes, Safety Single Trees. Racine Gate. Badger State Knuckle Gate Hinge, Economy Bolster Spring, &c.

MT. PLEASANT MFG. WORKS, Mt. Pleasant, Mich.: Butcher's Window Screen Frame. In this Frame, malleable iron brackets provided with lugs are so arranged that when clinched upon the wood tenon more firmness is obtained than by the use of screws or nails. Grooved strips are provided to be fastened to the blind stop, in which the Frame slides. These Frames are shipped knocked down, in five sizes, from 30 x 36 to 42 x 48 inches. This firm also manufacture Window Screens and Door Screens.

The Tests of Wire and Cut Nails.

ON WEDNESDAY, November 30, at the United States Arsenal at Watertown, Mass., at 12 o'clock M., were commenced the tests concerning the relative holding powers of Cut Nails and Wire Nails, which had been specified in the widely circulated and advertised challenge of the Cut Nail Manufacturers of the East to the Wire Nail Manufacturers of the United States, to submit the decision of the conflicting claims to the impartial arbitration of the splendid governmental testing machine, constructed by Major Emery, and famous as being the largest and finest machine of that character in the world.

The tests were made under the supervision of Major J. W. Reilly, the commanding officer of the Arsenal, and the machine was under the immediate charge of James E. Howard, the accomplished gentleman who has conducted the many interesting and elaborate governmental tests and examinations concerning the structure and strength of metals which have been published by the Government from time to time and are the valued tables of reference of our mechanical engineers.

A particularly noteworthy feature of the Nail tests was the entire absence of any representatives of the Wire Nails.

The Cut Nail manufacturers were represented by two of their committee—Arthur B. Clarke, president of the Old Dominion Iron & Nail Works of Richmond, Va., and Horace P. Tobey, treasurer of the Tremont Nail Company of West Wareham, Mass. Several other Cut Nail manufacturers were occasionally present during the tests, which were also watched with interest by Nelson Chase, the proprietor of a process for grooving the Wire Nail, to give it an increased holding power; by W. Wickersham, the inventor of the Wickersham Nail machine; Mr. Severance, the inventor of the Severance Nail machine, and by representatives of the press.

The tests were continued through Wednesday, Thursday, Friday and Saturday, when it became evident that several days more would be needed to complete them. Another pressing personal engagement of the members of the Cut Nail committee compelled an adjournment for a few days of the remaining tests.

The official report of the tests will not be made public until they are fully completed. It may, however, be stated that in every instance the Cut Nail showed a superiority in holding power over the Wire Nail of the same length and weight.

THE PEERLESS FREEZER COMPANY, Cincinnati, Ohio, have been incorporated with a capital of $20,000. The incorporators are C. M. Holloway, Charles F. Hofer, A. P. Kern, J. K. Holloway and Charles Holloway, Jr.

It Is Reported—

That J. J. McDonnell is putting up a large building at Brooklin, Maine, to be used for a Stove store and Tin shop.

That McKenna & Moore, dealers in Stoves and Tin, Los Angeles, Cal., have dissolved. Robert A. Moore will continue the business.

That H. M. Ballou, dealer in Hardware and Tin, Saticoy, Cal., has sold out his business to John Mattinson.

That Weed & Clark, New Haven, Conn., have sold out their Hardware business to Linsley, Root & Co.

That the Hill-Harber Hardware Company of Bloomington, Ill., have gone out of business.

That Ray & Brooks, Hardware dealers, Oregon, Ill., have sold out to Samuel Ray.

That Mr. Fisher, dealer in Stoves and Tin, Lewiston, Maine, is selling out.

That Bryant & Lander have lately commenced the Hardware business at Rumford Falls, Me.

That the store of the Crawford Hardware Company was destroyed in the recent conflagration at Winston, N. C.

That S. R. Compton has commenced the Hardware business at Harrisburg, Pa.

That James J. Lawler has purchased the Stove, Tin and Plumbing business formerly carried on by Lawler & Conway at Scranton, Pa.

That Levi S. Winchester, Riverside, R. I., has sold out his Hardware business to John P. Brownell,

That the Hardware store of Peterson & Schoring, Omaha, Neb., was burglarized on the 24th ult. A small quantity of Silverware and three Revolvers were stolen.

Exports to Australia.

PER SHIP "PATRICIAN," OCTOBER 26, 1892, FOR SYDNEY, N. S. W.

By W. H. Crossman & Bro.—Hardware, 6 cases, $80; Hardware, 5 cases, $140.
By H. W. Peabody & Co.—Hardware, 1 case, $35; Nails, 10 cases, $165; Blocks, 1 case, $15; Rivets, 1 case, $40; Hardware, 4 cases, $260.
By the Coombs, Crosby & Eddy Co.—Adzes, 1 dozen, $12; Axes, 12 dozen, $72; Saws, 2 dozen, $29; Shovels, 5 dozen, $31; Handles, 22 dozen, $15; Hammers, 5 dozen, $30; Picks, 2 dozen, $13; Stoves, 88, $950; Hammers, 2 cases, $25; Padlocks, 1 case, $15; Menders, 2 cases, $33; Stoves, 88 crates, $920.
By R. W. Forbes & Son.—Knives, 1 case, $18; Hardware, 2 cases, $25.
By F. & J. Meyer.—Axe Handles, 3 cases, $26.
By McLean Bros. & Rigg.—Rifles, 6 cases, $625; Reloading Tools, 2 cases, $89.
By H. T. Root.—Tinware, 1 box, $14.30.
By John A. Gifford.—Hardware package, $49.
By W. K. Freeman.—Lamp Goods, 25 packages, $95.90; Lanterns, 12 packages, $45.30; Lamp Goods, 20 packages, $70.30; Hardware, 4 packages, $14.64.
By Joseph F. McCoy Co.—Handles, 2 cases, $14.
By Edward Miller & Co.—Lamp Goods, 11 packages, $290.
By Ilsley, Doubleday & Co.— Hardware, 2 packages, $25.
McLean Bros. & Rigg.—Augers, 5 dozen, $57; Shovels, 40 dozen, $167; Cork Pullers, 6 dozen, $157; Planes, 16 dozen, $22; Stencils, 6½ dozen, $54; Chalk Lines, 1 case, $18; Dog Collars, 6 gross, $7; Augers, 1 dozen, $25; Twist Drills, 1 case, $53; Reloading Tools, 90 sets, $117; Tools, 7 dozen, $120; Thermometers, 1 case, $50; Handles, 22 dozen, $11.
By W. H. Crossman & Bro.—Scales, 6 dozen, $19; Axes, 19 dozen, $225; Road Scrapers, 3 dozen, $230; Hardware, 1 box, $150; Lamps, 1½ dozen, $75; Handles, 100 dozen, $135; Rifles, 2 cases, $230.
By Strong & Trowbridge.—Wheels, 2 crates, $45; Handles, 3 cases, $35; Axes, 10 dozen, $40; Rifles, 3 dozen, $30; Axes, 30 dozen, $245; Chucks, 3 dozen, $70; Handles, 94 dozen, $170; Handles, 24 dozen, $40; Axes, 3 dozen, $30; Castings, 455 pounds, $40; Wheels, 10 sets, $110; Whip Sockets, 6 dozen, $25.

FOR NEWCASTLE.

By Arkell & Douglas.—Cartridges, 26 cases, $730; Guns and Tools, 8 cases, $540.
By Henry W. Peabody & Co.—Builders' Hardware, 27 packages, $320; Lamp Goods, 6 packages, $55; Rat Traps, ¼ gross, $6; Primers, 150,000, $150; Handles, 32 dozen, $30.
By Strong & Trowbridge.—Cartridges, 6 cases, $75; Fruit Jars, 7 gross, $80; Axes and Hatchets, 17 cases, $180; Lampware, 14 dozen, $80; Cartridges, 124,000, $300; Tools, 1 case, $50; Rifles, 30, $200.
By Arkell & Douglas.—Scales, 8 gross, $22; Axes, 112 dozen, $1,108; Picks, 7 gross, $75; Tinware, 196 dozen, $110; Braces, 1 dozen; $25; Forks, 1 dozen, $28; Hammers, 12 dozen, $60; Hoes, 3 dozen, $42; Saws, 45 dozen, $71; Wrenches, 24 dozen, $65; Cages, 4 dozen, $20; Ladders, 7 dozen, $30; Tacks, 5 cases, $75; Traps, 6 dozen, $9; Lampware, 16 packages, $339; Hatchets, 40 dozen, $153; Hardware, 16 cases, $339.
By W. H. Crossman & Bro.—Bush Hooks, 3 dozen, $27; Platedware, 1 case, $29; Churns, 23 dozen, $28; Pump parts, 2 cases, $62; Air Rifles, ½ dozen, $9; Lawn Mowers, 3 dozen, $13; Scales, 4 dozen, $11; Primers, 20,000, $20; Lamp Goods, 2 packages, $21; Handles, 6 dozen, $3; Hardware, 4 cases, $81; Metallic Cartridges, 20,000, $220; Loaded Paper Shells, 4,000, $55; Rifles, 18, $210; Reloading Tools, 18 sets, $25; Gun parts, $18; Primers, 10,000, $11; Paper Shells, 3,000, $18.

PER BARK "N. B. MORRIS," OCTOBER 27, 1892, FOR WELLINGTON, NEW ZEALAND.

By F. H. Lovell & Co.—Lamps, 6 cases, $219.
By Abendroth Bros.—Stoves and parts, 6 packages, $83.73.
By Underhill, Clinch & Co.—Shovels, 1 case, $70.38; Hardware, 9 cases, $94.56; Traps, 1 crate, $1.50; Rivets, 1 crate, $4.68; Forks, 1 bundle, $7.92.
By W. R. Grace & Co.—Axes, 25 cases, $215.
By Arkell & Douglas.—Axles, 1 case, $52; Scales, 3 cases, $76; Meat Choppers, 23 cases, $452; Bolts, 16,000, $68; Wireware, 5 cases, $57.80; Cordage, 3 bundles, $111; Wringers, 6 dozen, $180; Lead Pencils, 1 case, $95; Air Guns, 3 crates, $212; Churns, 16 racks, $240; Tinware, 10 cases, $117; Plated Ware, 5 dozen, $317; Lampware, 10 packages, $482; Carpet Sweepers, 1 case, $48; Axes, 24 cases, $216; Tools, 16 dozen, $31; Handles, 370 dozen, $174; Hardware, 47 packages, $593.76.
By H. W. Peabody & Co.—Hardware, 57 packages, $775; Nails, 16 cases, $240; Shovels, 30 dozen, $255; Hardware, 36 packages, $350; Rat Traps, 1 case, $10; Shovels, 32 dozen, $190; Wringers, 1 dozen, $25; Tools, 10 dozen, $100; Hardware, 1 case, $20; Plated Ware, 2 hogsheads, $35; Lampware, 5 packages, $70; Plated Ware, 2 barrels, $60; Shovels, 10 dozen, $45; Tools, 15 cases, $135; Shovels, 2 cases, $150; Traps, 1 case, $10; Iron Castings, 3 cases, $45.
By Fayette R. Plumb.—Tools, 25 cases, $200.
By Manhattan Brass Company. — Lamp Goods, 23 packages, $572.
By W. H. Crossman & Bro.—Carriage Hardware, 14 cases, $410; Iron Bolts, 2 cases, $74; Hay Forks, 1 case, $9; Sash Cord, 1 bundle, $36; Blocks, 9 packages, $250; Shovels, 3 cases, $300; Hardware, 20 packages, $65.
By R. W. Cameron & Co.—Guns, 1 box, $25.
By Union Stove Works.—Stoves and parts, 10 packages, $103; Iron Fittings, 1 box, $10.
By Mailler & Quereau.—Handles, 60 cases, $475; Axes, 150 cases, $1500.
By R. W. Forbes & Son.—Horse Nails, 32 boxes; Shovels, 2 cases, $145; Horse Nails, 9 cases, $257; Stoves, 18 crates, $205; Cartridges, 3 cases, $46; Axes, 25 boxes, $202; Hammers and Wrenches, 9 cases, $157; Wringers, 16 cases, $195; Hardware, 36 packages, $483; Handles, 5 packages, $59; Air Guns, 2 cases, $48; Lampware, 16 packages, $162.
By the F. B. Wheeler Company.—Hames, 1 case, $17.10; Whips, 1 case, $6.51; Hardware, 9 cases, $98.04; Scythe Stones, 3 cases, $8.88; Bird Cages, 1 case, $15.09; Hardware, 3 cases, $109.85; Wringers, 1 case, $11.10; Lamps, 14 packages, $256.73; Stoves, 3 crates, $19.50; Hardware, 28 cases, $343.32; Axes, 25 cases, $175; Hardware, 10 cases, $36.39; Pencils, 1 case, $29 22; Stoves, 2 cases, $19.53; Wringers, 5 cases, $56.80; Braces, 1 case, $17.55.
By McLean Bros. & Rigg.—Axes, 47 cases, $425; Shovels, 1 case, $86.50; Scales, 17 cases, $227.60; Horse Nails, 13 cases, $402; Stoves, 32, $246.50; Pulleys, &c., 6 cases, $152.15; Bench Screws, 4 cases, $10.75; Picks and Mattocks, 14 dozen, $66; Mouse Traps, 24 dozen, $25; Pumps, 25 dozen, $91; Mouse Traps, 36 dozen, $35; Shovels, 20 dozen, $167; Lamps, 3 dozen, $57; Handles, 10 dozen, $5; Hammers, 2 dozen, $110; Sad Irons, 5 dozen, $7; Mangles, 12 dozen, $61; Agateware, 41 dozen, $141; Coffee Mills, 2 cases, $12; Plows, 2 cases, $27; Cultivators, 4, $17; Castings, 2 cases, $28; Whetstone, 1 case, $23; Plows, 3 cases, $38; Carriage Hardware, 1 case, $35; Saws and Files, 3 cases, $156; Braces, 1 case, $33; Builders' Hardwaoe, 3 packages, $36; Pulleys, 6 cases, $41; Graniteware, 3 cases, $131; Wire Goods, 5 packages, $22; Sash Cord, 1 bale, $25; Axes, 37 cases, $297; Horse Nails, 5 bundles, $48; Twist Drills, 1 case, $7; Saws, 1 case, $143; Lampware, 34 dozen, $238; Carpet Sweepers, 2 cases, $24; Handles, 30 cases, $230; Lamps, 9 cases, $269; Sad Irons, 3 cases, $15; Bells, 3 cases, $14; Wheels, 7 crates, $45.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

The past week has witnessed no exception to the usual December experience in the market for Paints and Colors. Bulk goods used by grinders have been purchased in a strictly purfunctory manner. The distribution of the leading pigments adapted for house painting has not exceeded routine proportions, nor have prepared Paints for special uses enjoyed anything more than fair winter season sale. The whole list might be outlined in a similar manner until holiday specialties in the shape of artists' materials, &c., are reached. In that line the business has been fully up to the aggregate of the preceding week, and, in some instances, it was represented that the season's record to date is in flattering contrast with that of the corresponding period last year. No new influences calculated to affect values of the more staple lines of goods have come to the surface and about the only matter of serious concern is the future of White Lead, something definite regarding which may possibly be divulged at head quarters at the eleventh hour.

White Lead.—A repetition of last week's report covers all that there is to say of the market. Business tapers off, as natural towards the close of the year, and a general feeling that the National Lead Company will ere long respect the popular demand for lower prices tends to additionally restrict purchases by the jobbing trade for the time being. Outside manufacturers are proceeding cautiously pending some word from headquarters, since the chances for business except at guaranteed or protected prices are extremely vague until the situation is more clearly defined. At second hands, list prices are wholly nominal and actual selling rates are gauged in a great measure upon what force the leading pigment may have as a "trade winner" at cut rates.

Red Lead and Litharge.—Outside of strictly routine business, the aggregate of which is represented as being fair for the season, little or nothing has been done in this line during the past week. The same statement will apply to Orange Mineral. List prices remain as before, but are more nominal than otherwise, particularly in the jobbing branch of the trade.

Zincs.—The market for American Oxide is entirely bare of new feature. Ores are cheap, the output of Oxide is heavy and new orders are not only commonplace, but hardly up to the average for this season. However, nothing occurs to disturb the friendly relations between manufacturers that have existed since the beginning of the year, and, unless all signs and the general report are in conflict with the facts, the old line of prices is adhered to. The position of the market for foreign brands is quite as devoid of new feature. Sales are small, importations are gauged accordingly, and all business at first hands is at prices that have remained stationary long enough to become monotonous.

Colors &c.—Outside of some few lines of Dry Colors that are consumed largely elsewhere than in the painting trade, business has been almost at a standstill. Grinders have placed few and only unimportant orders for bulk goods, jobbers' purchases have been of strictly routine character, and the distribution at second hands is on strictly winter season lines. On Oil Colors and Mixed Paints the same is to be remarked, with the modification that a few specialities in Ready Mixed Paints have moved out very fairly on orders from the South. Prices all along the line remain practically the same as they have been for some considerable time past.

Miscellaneous.—There is no new feature in the market for Block Chalk. Spot stocks are moderate, the demand for sail cargoes is light, and the offering is reserved, with full prices asked. Whiting, Paris White and Putty are slow of sale and moving at old prices. In Barytes, China Clay, Terra Alba, &c., there is hardly enough doing to determine market value.

Oils and Turpentine.

The strong undertone that characterized the market for nearly all lines of Animal and Vegetable Oils last week remains unbroken. In some departments the strength has gained force, and the conditions leading thereto proving to possess enduring qualities has caused hesitant buyers to take hold at prices that had previously been considered too high to receive serious consideration. Particularly is this the case in the instance of Cotton Seed Oils, Lard Oil and various lubricants the value of which is governed more or less by that of the hog product. The only weak spot is in Mineral Oils, the competition among sellers of which is unusually keen at the present time. Taken as a whole business is of quite good volume for the season, but buyers are very discreet, and it is the exception that purchases are in excess of imperative wants. In point of fact speculation has seldom been as tame when incentive to venture was as strong as it is in some lines at the present time.

Linseed Oil.—There are a few ripples on the surface that attract more than passing notice. One of these is the negotiation under way with a view of centralizing the Linseed Oil interests in the hands of the capitalists who control the production of White Lead made by the old Dutch process—in other words, by what is commonly known as the Lead Trust magnates. The other is a sort of restiveness on the part of a few impatient outsiders, who, finding limited outlet for their product and a rather weaker market for seed, seem anxious to sell Raw Oil at a little under the market. That is to say, orders have been solicited, if, indeed, not taken, at 45¢, although 46¢ is understood to be the general price. Generally speaking, the distribution is of average volume for the season, but just at this time the outlet is by no means broad.

Cotton Seed Oils.—Several operators who sold "short" early in the season and a number of buyers who held aloof because of an inborn conviction that prices were being run ridiculously high by manipulators, have enjoyed anything but an enviable experience during the past week, covering old sales and buying for actual needs. Enough competition has developed to advance prices still further, although exporters have figured with no prominence as actual or prospective buyers. Both crude and refined Oil seems to be scarcer now than it was when market quotations were 2¢ @ 3¢ lower. Sales of prime crude have been made at 32¢ to 34¢. Prime Summer Yellow realized 37½¢ @ 38¢, against 35¢ a week ago, and other grades have been sold at corresponding prices. The Union Oil Company announce an advance to 44¢ @ 46¢ for Winter Yellow and 45¢ @ 47¢ for Winter White.

The Accurate Time Stamp.

The Accurate Time Stamp Company, 669 to 685 Hudson street, New York, have perfected their No. 3 stamp, as shown in Fig. 1, which is superior to the stamps heretofore produced by them. The arrangement of the working parts of the stamp is described as follows: The month, date and time of the day are set automatically at the correct fraction of the proper second of time. This includes the automatic setting of the first day of a new

Fig. 1.—The Accurate Time Stamp.

month for a long or short month, and February of a common or leap year. The mechanism accomplishing this is positive and certain and surprisingly simple, when the high degree of automaticity is taken into account. The type wheels are continuously and positively locked, which absolutely prevents their being tampered with by unauthorized persons, or shifted while the impressions are taken. The stamps are so constructed that the power driving them is equalized every minute, thus running under the best conditions attainable. They are accurate time keepers, in fact, keeping time better than ordinary clocks of the best quality. The mechanism is mounted independently of the clock

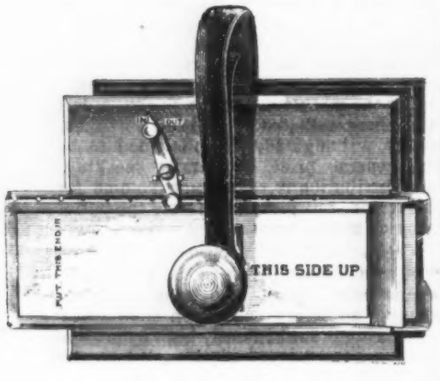


Fig. 2.—Adjustable Gauge Attachment.

movement, so that no amount of ordinary use can disarrange it. It is not moved by the power of the clock and has no rigid connection with it.

Attention is called by the makers to an invaluable feature of the stamp, by which the liability to disarrangement is reduced to a minimum. The name of the person or firm doing business, location and character of the transaction, with the correct date and time to the minute, are printed with the stamp at one impression.

The top and bottom lines can be changed in an instant, and the space left blank, or four additional words, such as "accepted," "balanced," "canceled," "commenced," "delivered," "finished," "mailed," or any words required to describe a particular transaction, can be brought into use by turning either of two projecting knobs. Or one of these adjustable cylinders may be supplied with the names of the different officers of the company, thus providing a convenient way of signing. The stamp is made, when required, in combination with a numbering device operated in unison with the date impression. The makers claim that the stamp makes its impression clearly in plain type and in straight lines; that it prints the correct current date and time; that being operated by the best marine clock movement money will buy, it also serves as a first-class time piece; that it requires no attention but winding once a week; that it serves as a calendar clock; that it is simple, durable and ornamental; that it is absolutely automatic in setting dates for long and short months, even to February of leap year; that it has a setting attachment, analogous to that on a watch, by which the minute and hour hands can be moved with facility; that it has a regulator

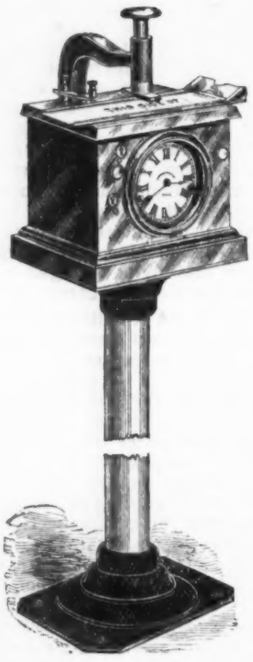


Fig. 3.—Stamp Mounted on a Stand.

grip, which prevents the severest usage from affecting the time-keeping quality; that the figures and letters on the six wheels of the stamp train are engraved in the solid metal, thus securing a superior impression and the greatest possible durability; and that its record cannot be tampered with.

It is suggested by the manufacturers that in many offices a reliable time stamp is absolutely necessary, and that other general business offices will find the Accurate time stamp very useful and convenient in dating orders, letters, telegrams and documents of every description, thereby preserving a legal record as to time and date of all transactions.

It may also be found useful and serviceable in all banking, financial and recording offices, in telegraph, railroad, insurance, messenger and telephone services, in all mercantile and commercial business where an accurate record of time is indispensable. The point is made that the stamp embodies the very essential qualities of reliability, accuracy and utility.

RECORDING TIME OF EMPLOYEES.

For taking the time of employees, in going to and returning from work, the stamp has an adjustable gauge attached to its top, into which the employee slips his time card, and stamps it, afterward replacing his card in its pocket in the card rack. Fig. 2 shows a top view of the time stamp, with gauge attached, and card in position to be stamped.

The record side of a card is herewith shown as it would appear with the record partly made.

No. .....

Name .....

Mon.	IN	OCT 4	7 00 A M	1892
	OUT	OCT 4	12 00 P M	1892
	IN	OCT 4	1 03 P M	1892
	OUT	OCT 4	6 00 P M	1892
Tues.	IN			
	OUT			
	IN	OCT 5	1 02 P M	1892
	OUT	OCT 5	6 00 P M	1892
Wed.	IN	OCT 6	7 04 A M	1892
	OUT	OCT 6	12 01 P M	1892
	IN	OCT 6	1 29 P M	1892
	OUT	OCT 6	6 00 P M	1892
Thurs.	IN	OCT 7	7 00 A M	1892
	OUT	OCT 7	12 01 P M	1892
	IN			
	OUT			
Fri.	IN	OCT 8	7 08 A M	1892
	OUT	OCT 8	12 01 P M	1892
	IN	OCT 8	1 03 P M	1892
	OUT	OCT 8	6 00 P M	1892
Sat.	IN	OCT 9	7 18 A M	1892
	OUT	OCT 9	12 00 P M	1892
	IN	OCT 9	1 01 P M	1892
	OUT	OCT 9	5 00 P M	1892
Sun.	IN			
	OUT			
	IN			
	OUT			

Both sides of the card may be used if the employees are paid every two weeks.

In this system the time card has the number and name of the employee in juxtaposition, and in plain view as it stands in the rack. This avoids the trouble of running through a long list of names to identify employee's name and number; thus combining convenience, accuracy and dispatch in making up the pay-roll.

If it is necessary to refer to the record after pay day, the pay card, containing a complete record made by a workman and verified by him, can be referred to almost instantly. It saves a large amount of bookkeeping, and the time card is also the pay card for one or two weeks, as required, thus facilitating the paying off.

If, under the rules of the establishment, the employee is so tardy as to be subject to deduction, the minutes late are carried to the margin of the card, and deducted from the total at the bottom.

The point is made that the stamp saves the salary of a time keeper or the time and attention of the foreman.

The advantages of this system, as pointed out by the makers, are as follows: Each employee is his own time keeper; the record is plainly printed by the workman, and is verified by him before his card is replaced in the rack; all friction and disputes are thus avoided, and favoritism is impossible. The record is absolutely just to both employer and employee, and finds favor with both, while it secures punctuality hitherto unknown.

The gauge and card can be so modified when placing the order as to adapt the system to the preferred practice of the purchaser. When the stamp is used for recording the time of employees, it is mounted on a stand as shown in Fig. 3; the stand being nickeled and japanned to match the finish of the stamp.

WATCHMAN'S TIME DETECTOR.

To adapt the stamp for use as a watchman's time detector, a metal box containing a folded perforated paper tape is attached to one side of the time stamp, the watchman drawing the perforated tape under the plunger of the stamp at the required times.

He then stamps the impression in duplicate, tears off the slips and drops one of them into a locked metal box attached to the other side of the stamp. The other impression he puts in his pocket, to be produced in case fire destroys the premises. This double check insures extraordinary faithfulness.

It is claimed that it is impossible for the watchman to tamper with the time stamp, on which he is required to make impressions at certain hours and minutes.

In adapting the time stamp for the use of several stations, the stamp, placed wherever the employer prefers, is connected electrically with as many stations

Fig. 4.—Metal Station Box.

as are required. At a given station on his round the watchman inserts a key into a metal station box, Fig. 4. By turning the key electrical connection is made, and the magnet on the stamp makes the impression on a moving tape, thus: STATION NO. 10, DEC. 11, 2:31 A. M., 1892. The number of the particular station is printed by combining with the stamp one or more of the wheels of the numbering machine, and is printed clearly in large type.

It is stated that the same impression never occurs again in the history of the world, and that the record can never be taken in advance or subsequently. Moreover, the system has an additional check, for when the watchman inserts his key in the station box and turns it, two dials in the box are advanced, the one showing the number of the station and the other the number of the round.

The station box, with the automatic record on the stamp tape, it is stated, constitutes a complete system.

TIME STAMP AND NUMBERING MACHINE.

The time stamp used with the numbering machine is referred to as a very simple and very perfect combination for recording offices, timing and numbering piece work, &c., and especially for messenger and telegraph offices, to insure faithfulness and prevent fraud. When a messenger starts on a service he slips his ticket into the gauge on the stamp marked "Outgoing," and, striking the plunger, prints in proper place on ticket:

SERVICE NO.
002177 DEC. 20. 10:41 P.M., 1892.

When he returns he prints on the "Incoming" stamp the date line only, not the number, but above the outgoing date, so that at a glance the manager sees the time consumed. In settlement with the branch offices the general office will find this system invaluable. There should be printed on the ticket this notice: "The absence from this ticket of a number and the day, hour and minute of this service, printed by the office time stamp, is *prima facie* evidence of fraud. In such case please notify the general office."

FOR FIDUCIARY INSTITUTIONS.

When the stamp is designed for use in institutions of this kind a desk is made, into which the stamp is built, and the stamp is worked on its side. Attached to the lid of the stamp is a long metallic throat, coming up to the surface of the desk. The entering or departing watchman writes his name on a card, on which is printed "In" or "Out," and its consecutive number. This card is dropped into the long throat, in the depths of which it meets a spring stop; the watchman then strikes the plunger of the stamp, printing the date, hour and minute, and A. M. or P. M., in the proper place on the card. The stop is then pulled, the card drops into a box in the lower part of the desk secured by a combination lock.

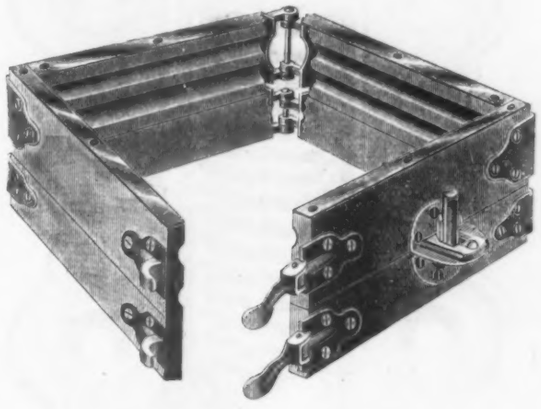
For railroad use the stamp may be placed in each station and be made to record the passage of a train automatically by electrical action. It is used to date tickets, especially limited and insurance tickets. It is very useful also in paymasters, shipping and other departments.

The stamp may also be used for street railways to date, and thus limit transfer tickets, preventing improper use of the tickets and fraudulent returns of same.

For recording fares in street cars it is operated either mechanically or electrically.

Eureka Snap Flask.

C. H. Green & Co, successors to Green & Fournier, 1415 Grape street, Syracuse, N. Y., are offering a form of ready-made snap flask, as shown herewith. It is explained that the hinges are so constructed that when opened they admit of no sand getting into them. The guide is quickly and easily adjusted, while the V-shaped pins insure a square and perfect lift of the cope. Both edges are bound with heavy iron; the corners are all rabbeted together and bound with heavy corner irons, and the cope is grooved all around, so as to prevent the sand from



Eureka Snap Flask.

sagging in lifting off. The cut represents Nos. 1 and 2; No. 1 is made of hardwood, and No. 2 of whitewood.

The census shows that 264,000 Canadians removed to the United States during the decade ended 1890. As a leading Conservative put it, Canadians are being annexed in "job lots."

Columbia Post-Hole Digger.

Gibbs Mfg. Company, Canton, Ohio, are making the digger illustrated herewith. The blades are made of the best

Columbia Post-Hole Digger.

tempered cast steel, and the irons of good malleable, while the handles are of selected hickory, well oiled. The claims are made that the handles are close together and easily grasped; that holes of any desired diameter can be dug, and as deep as the full length of the digger; that it is easily operated and does rapid work, and that the tool is neat, well finished and attractive in appearance. The manufacturers warrant every digger to do good work and replace any defective parts free of charge.

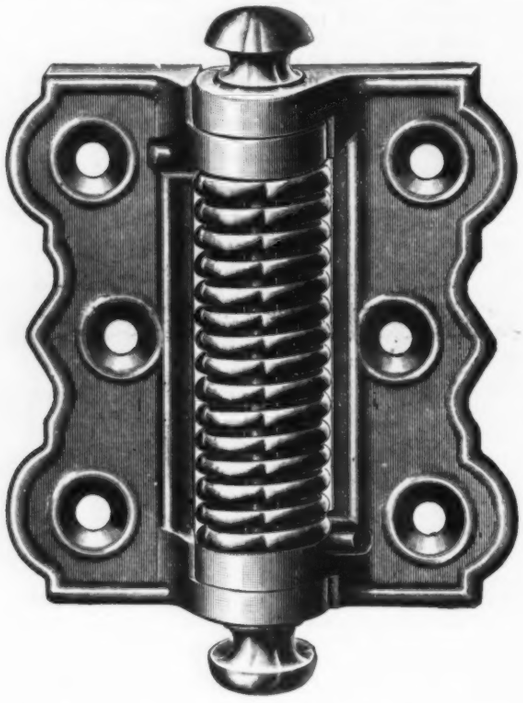
Adjustable Guide Plow.

William T. Wood & Co., Arlington, Mass., manufacturers of ice tools (Jas. A. Bogardus, 167 Chambers-street, New York, selling agent), have recently commenced the manufacture of an adjustable guide plow, as here illustrated, which they are offering to such as find it necessary to cut cakes of varying widths, but who do not care to have a plow for each size. They point out that while a purchaser saves the price of one guide in buying the Adjustable, he loses time in marking out, as he must cross the ends of his ice field instead of returning by the groove last cut. Especial care should be taken when adjusting the guide to have each end exactly parallel with the plow, otherwise it will bind. In using this plow they direct the operator to strike out the first line in the center of the ice field, and then work both ways, crossing at the ends.

Adjustable Guide Plow.

Stearns' Spring Hinge, No. 51.

E. C. Stearns & Co, Syracuse, N. Y., are making the hinge shown in the accompanying illustration. It is referred to as being simple in construction, of extra heavy castings and as having no light parts to break or get out of order. The action of the hinge is exceptionally strong and free, the spring stiff and elastic, the latter being kept in line by the ribs on the pin in the center of the coil. The hinges are packed with the tension of the spring adjusted ready for use and are designed to be used on either right or left hand doors. They are finished with japanned leaves and coppered or tinned springs and are packed one dozen pairs in a slide cover wooden box, one gross pairs in a case.



Stearns' Spring Hinge, No. 51.

The Eagle Wrench.

The accompanying cut shows a general view of the Eagle wrench, which is a tool just brought out by the Hollands Mfg. Company, Erie, Pa. The pipe wrench consists of alligator jaws, having a deep slot between them, in which is pivoted a movable hook. The hook is cam shaped, provided on its inner face with teeth for catching the surface of the pipe. The pivot upon which the hook swings is considerably to the rear and somewhat at one side of the center of the V-shaped bearing between the jaws of the wrench, so that any movement of the handle down forces the teeth of the hook against the pipe and prevents its turning in the V-shaped bearing, and forces the teeth into the pipe. The reverse motion, of course, loosens the clutch. The hook is a drop forging pivoted on a steel pin; the shank is made of malleable iron and the handle of wood. It is pointed out that the advantages of this wrench are that it instantly adjusts on any size of pipe and that there are no springs or small parts to give out, consequently requiring few repairs. The wrenches are made in two sizes: No. 1, adapted to pipe from ⅛ to 1 inch, and No. 2, from ¼ to 2 inch pipe.

The Eagle Wrench.

Rudolph's Adjustable Cheek Protector.

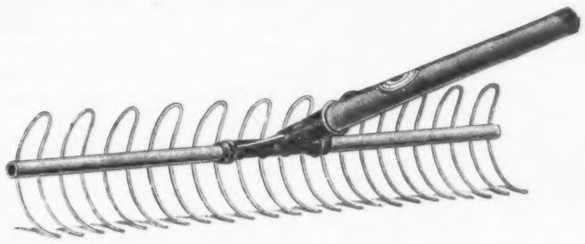
Hibbard, Spencer, Bartlett & Co. of Chicago offer to the trade this device, which will be greatly appreciated by sportsmen. The object sought is to protect the cheek while firing heavy charges from a shotgun or rifle. The accompanying illustration shows how it is attached to the stock of the gun or rifle. It consists of a stout piece of grain leather which passes completely around the stock and is laced in position. Attached to the leather body is a pad made of best quality hair covered with soft kid. The protector is described as throwing the eye along the line of sight, fitting almost any gun or rifle, and arranged for right or left hand shooters. The device has met with much favor wherever it has been introduced.

Rudolph's Adjustable Cheek Protector.

THE C. T. WILLIAMSON WIRE NOVELTY COMPANY of Newark, N. J., have recently purchased the entire corkscrew plant of Howe Bros. & Hulbert, West Winsted, Conn., and removed it to Newark, where they hope in a very short time to be able to meet the wants of the trade for all varieties. With this addition to their works the company claim that they are now the largest manufacturers of corkscrews in this country. The company are also supplying a line of wire novelties in highly polished nickel plate or other desirable finishes for the house furnishing and builders' trade, these goods being referred to as neater and better finished than those made from rough iron castings. The company advise us that they are doing a large business, and are endeavoring to keep up with the demand by increased facilities.

Acme Lawn Rake.

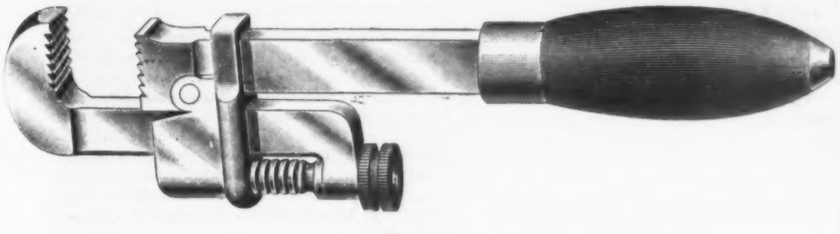
Gibbs Mfg. Company, Canton, Ohio, for whom John H. Graham & Co., 113 Chambers street, New York, are agents, are putting on the market this rake, as herewith illustrated. The head is made of a single piece of sheet steel, having clips punched through that clasp over the teeth. The shape of the teeth is such as to ride easily without tearing the sod, or clogging. The point is made that a large amount of grass, &c., is carried, owing to the fact that the teeth extend on either side of the head, forming a light hood. The handle is attached by a strongly braced socket. A desirable feature of the rake is that by reversing the rake, single or bowed teeth can be had, the one for cut grass and the other for leaves and rubbish. The rake is galvanized, preventing rust, and the manufacturers state that the teeth cannot become loose.



Acme Lawn Rake.

Columbian Pipe Wrench.

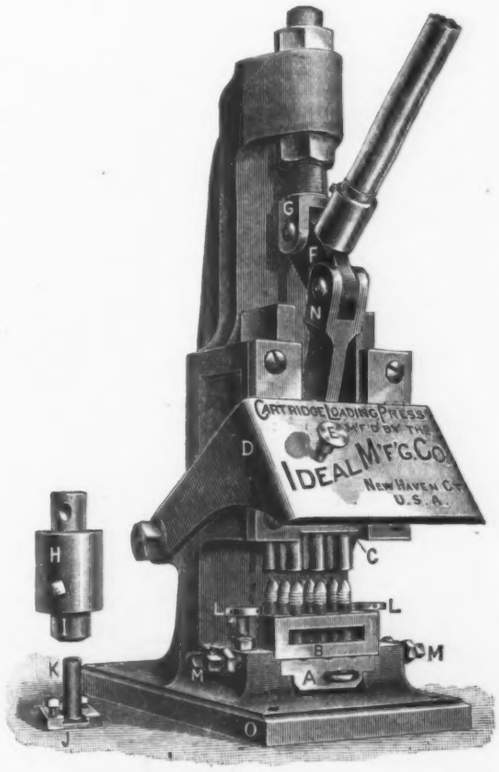
Columbian Mfg. Company, Brockton, Mass., are introducing the pipe wrench as shown in the accompanying illustration. The wrench is described as made of finest steel, and put together in the best possible manner. It is regulated by means of a solid steel screw running through one end of the jaw to the sleeve. It is stated that the grip of the wrench is quick and firm, and that when once attached will hold until released, without crushing the pipe, as the jaw rests against the handle bar and cannot be forced beyond the gripping point. Releasing the wrench from the pipe requires but a simple movement of the hand, when a spring brings the jaws into place again. The principal points claimed for the wrench are its strength and ease of adjustment. The wrench is made in all regular sizes and is handsomely finished.



Columbian Pipe Wrench.

Cartridge Loading Press.

Ideal Mfg. Company, New Haven, Conn., are introducing this press, as shown in the accompanying cut. This is a press of the hand-lever type, substantially made and designed for constant use. The tools consist of one pin plate, C, one shell plate, B, and one shell-resizing die, I, shown in the collet H at the side of the machine. These tools must be made specially for each different cartridge, and will be made interchangeable. Thus the same machine, it is explained, may be fitted up with various sets of tools, such as .50–.70 Government, .45–.70 Government, .43 Spanish, .45 Martini-Henry, .32, .38 and .44 calibers Winchester, Marlin and Colt's. All the machines will be made to a specific standard gauge, so that tools may be ordered from any part of the world for any particular cartridge, either foreign or domestic, the fit and the interchangeablity being guaranteed by the makers. The adjustments are such that with the proper tools the largest military and sporting shells as well as the pistol sizes can be loaded, making it, it is remarked, a universal tool of special value in localities that are situated far from manufactories of ammunition, yet where arms are used extensively, as the metallic shells or cases can in this way be used many times. The manufacturers state that the machines can be used to great advantage as an economizer of ammunition, and that they are intended particularly for regimental armories where several companies, a whole regiment, or several regiments may have the shells reloaded after emptying them at target practice, thus saving the shells that are now wasted.



Cartridge Loading Press.

The Hine Oil Can.

The Youngstown Stamping Company, Youngstown, Ohio, are putting an oil can on the market, as shown in the accompanying cut. The principal feature of the can is the breast or dome. The diameter of the dome at the base is less than the diameter of the can, and a right-angled flange extends from the base of the dome to the sides of the can, thus forming a groove about the base of the dome. The outer edge of the flange is turned over and down upon the outside of the can. A screw cap is placed at about the center of the dome and the spout is braced to the side of the can.

The Hine Oil Can.

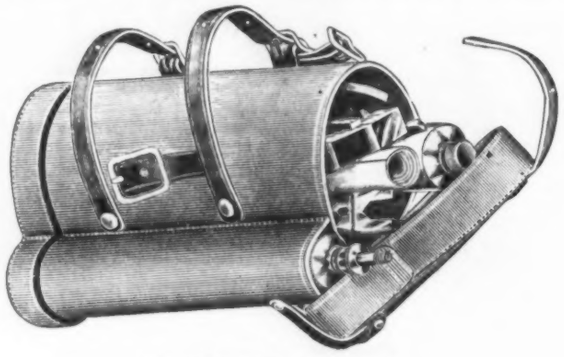
Columbia Can Opener.

A. F. Meisselbach & Bro., Newark, N. J., are offering this opener, as shown herewith. The handle is cast iron, polished and nickeled, the end of which is widened so as not to hurt the hand when perforating the can. The knife is of finely tempered steel, with a sharp cutting edge and attached to the handle by a screw. This permits the blade being removed for sharpening or to replace if broken. The manufacturers claim the opener cuts without slipping or tearing, and that it will open the can at the extreme edge, so that the contents may be removed without shredding, tearing or being disfigured. The opener is put on the market as a high grade tool, tastefully mounted, one dozen on an A-shaped card, half a dozen on each side, for standing on the showcase, and are well made, handsomely finished and attractive in appearance.

Columbia Can Opener.

The Swift Pneumatic Tool Bag.

The Coventry Machinists' Company, 239 Columbus avenue, Boston, and 13 Madison street, Chicago, are manufacturing this article, as illustrated herewith. The bag is made of a fine quality of imported sole leather, sewed and riveted, thus insuring its durability. The parts being made inseparable, there is no danger of loss of any part of the bag, and the tools are held in place by a neat strap. The manufacturers state that the bag carries all the tools necessary for the repair of pneumatic tires, and that the device will be appreciated by those who have punctured or broken their tire, where no repair shop was at hand. The bag is attached to any make or part of wheel, and is prevented from rattling by means of an invisible safety strap.



The Swift Pneumatic Tool Bag.

Copper Nails for Fastening Slate on Roof of Gasometer.

The Salem Nail Company, 290 Pearl street, New York, have recently commenced the manufacture of a copper nail, as here illustrated (being a full-size cut of the 4-inch) which is used for fastening slate on the roofs of gasometers, &c. They have long made a lead nail for this purpose, but lately, having inquiries and orders for a copper nail, decided to produce it. Their orders are mainly for 3 to 4 inch, although other lengths in paying quantities could be furnished. The method of using is to pass the nail through the hole in the slate and twist it around the metal, the material not being affected by the corrosion which occurs where iron is used.

Copper Nail for Slate Roofing.

W. Houseman of Seneca Falls, N. Y., has invented a heavy steel screen, bored with loop holes to fire through and made to swing on a pivot. It is designed to protect the men on a war vessel from the shots of the enemy. He has two models; one is a double screen. Mr. Houseman also has two models of tapering tubes, one for use against burglars in residences and the other against express or passenger car robbers. These tubes are designed to be used to fire bullets through.

Mr. Bland, Chairman of the House Coinage Committee, expects nothing of the Brussels conference and would proceed at once to coin all the bullion that has been purchased. By so doing we could make money of silver and force England to accept it as such. Nearly 125,000,000 ounces of silver having been purchased under the Sherman law, which would coin about $162,000,000, the Government, Mr. Bland says, would gain $50,000,000 with which to help the Treasury through the coming fiscal year. Of course, there would be a scramble for gold, as Mr. Bland foresees, but the "crash" to follow has no terrors for the sturdy silver champion!

Parties in British Columbia have chartered a steamer to trade regularly between Puget Sound ports and the Hawaiian Islands.

The Government factory at Newport has made 30,000 pounds of gun cotton during the past year. Cop waste is the principal material used and for every pound of cop used the average yield is only 1.7 pounds of gun cotton.

CONTENTS.

PAGE

The Excelsior Iron Works, Chicago. Illus...1083
American Society of Mechanical Engineers. Illustrated...1084
The Carnegie Natural Gas Contract...1099
Hollow Shafting in Modern Steamships. Ill.1100
The Sale of the Calumet Iron & Steel Works.1100
Direct Coupled Generator and Engine. Ill..1101
The New Doty Punching Machine. Illus ..1101
World's Fair Notes...1102
The First American Casting. Illustrated...1104
The Stimson Institute for Artist-Artisans...1105
The Utilization of Niagara Falls. Illustrated.1106
Pneumatic Pumping Apparatus.—II...1110
Multiple Horizontal Car Borer. Illustrated..1112
Heavy Vertical Milling Machine. Illus...1113
The Week...1114

Editorial:
The Decline in Cost of Production...1116
Pushing the Nicaragua Canal...1116
Lake Ore Shipments...1117
Jay Gould's Death...1117
Obituary...1117
Correspondence...1117
Mahoning and Shenango Valleys...1118
The Joliet Steel Works Club...1119
Washington News...1119

Manufacturing:
Iron and Steel...1120
Machinery...1120
Miscellaneous...1121

Trade Report:
Philadelphia...1121
Chicago...1122
Louisville...1123
Cleveland...1123
St. Louis...1124
Pittsburgh...1124
Cincinnati...1125
Detroit...1125
New York...1125
Metal Market...1126
British Iron and Metal Markets...1126
The Position of Tin...1127
Pig-Iron Production...1127
The Tin-Plate Makers...1127

Hardware:
Condition of Trade...1128
Notes on Prices...1128
Trade Items...1129
The Hardware Club of New York...1130
Duty on Imported Fire Arms...1130
Export Notes...1131
Catalogue of the American Screw Company...1131
Hardware in New Zealand...1131
Failure of the Joliet Enterprise Company.1131
Aluminum Cooking Utensils...1132
Banquet for Travelling Men...1132
Exports...1133
Buffalo Axle-Washer Rack. Illustrated...1135
Inventory Methods. Illustrated...1135
Price Lists, Circulars, &c...1135
The Tests of Wire and Cut Nails...1136
It Is Reported—...1136
Exports to Australia...1136
Paints and Colors...1137

The Accurate Time Stamp. Illustrated...1138
Eureka Snap Flask. Illustrated...1139
Columbia Post-Hole Digger...1139
Adjustable Guide Plow. Illustrated...1140
Stearns' Spring Hinge, No. 51. Illustrated..1140
The Eagle Wrench. Illustrated...1140
Rudolph's Adjustable Cheek Protector. Ill.1140
Acme Lawn Rake. Illustrated...1141
Columbian Pipe Wrench. Illustrated...1141
Cartridge Loading Press. Illustrated...1141
The Hine Oil Can. Illustrated...1141
Columbia Can Opener. Illustrated...1141
The Swift Pneumatic Tool Bag...1142
Copper Nails for Fastening Slate on Roof of Gasometer...1142
Current Hardware Prices...1143
Current Metal Prices...1150

Current Hardware Prices.

DECEMBER 7, 1892.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers at the figures amed.

The character @ is used to indicate a range of price; thus discount 50&10@50&10&5 % signifies that the goods in question are sold at prices ranging from discount 50 and 10 % to discount 50 and 10 and 5 %.

Adjusters, Blind—

Domestic.....₱ doz $3.00, 33⅓%
Excelsior....₱ doz $10.00.....50&10&2%
North's.....list net @ 10%
Zimmerman's—See Fasteners Blind.

Ammunition—See *Caps, Cartridges, Shells, &c*

Anvils—

Eagle Anvils, ₱ ℔ 9¢..... 15@15&5%
Peter Wright's.....11@11½%
Armitage's Mouse Hole.....10½@11¢
Am. Wrought, Horse shoe brand..11@11½¢
Trenton.....10@10½¢
Wilkinson's.....10½@11¢
Moore & Barnes Mfg. Co.....33⅓%

Anvil Vise and Drill—

Millers Falls Co., $18.00.....20%
Cheney Anvil and Vise.....25%
Allen Anvil and Vise, $3.00.....40&10%
Star.....45&5%

Apple Parers—See *Parers, Apple, &c.*

Augers and Bits—

Douglass Mfg. Co.
Wm. A. Ives & Co.
Humphreysville Mfg. Co.
French, Swift & Co. (F. H. Beecher) } 75 %
P. S. & W. Co.
Rockford Bit Company.
Cook's, Douglass Mfg. Co.....55%
Cook's, N. H. Copper Co.....60%
Ives' Circular Lip.....60%
Patent Solid Head.....30%
C. E. Jennings & Co., No. 10, extension lip.....40%
C. E. Jennings & Co., No. 30.....60%
C. E. Jennings & Co., Auger Bits, ₱ set, 32⅛ quarters, No. 5, $5; No. 30, $3.50.25%
Lewis' Patent Single twist.....45%
Russell Jennings' Augers and Bits.25&10%
Imitation Jennings' Bits.....60@60&10%
Pugh's Black.....20%
Pugh's Jennings Pattern.....30%
Car Bits.....60@60&10
Car Bits, P. S. & W. Co.....60&10
Snell's Car Bits.....60%
L'Hommedieu Car Bits.....15&10%
Forstner Pat. Auger Bits.....20%
Cincinnati Bell-Hangers' Bits.....30&10

Bit Stock Drills—

Morse Twist Drills.....50&10&5%
Standard.....50&10&5%
Cleveland.....50&10&5%
Syracuse, for metal.....50&10%
Syracuse, for wood (wood list).30@30&5%
Cincinnati, for wood.....30&10%
Cincinnati, for metal.....45&10%

Expansive Bits—

Clark's small, $18; large, $26..35@35&10%
Ives' No. 4, ₱ doz. $60.....40%
Swan's.....40%
Steer's, No. 1, $26; No. 2, $22.....35%
Stearns' No. 2, $48.....20%

Gimlet Bits—

Common.....₱ gross $2.75@$3.25
Diamond.....₱ doz $1.25.....40&10%
Bee.....25@25&5%
Double Cut, Shepardson's.....45@45&10%
Double Cut, Ct. Valley Mfg. Co....30&10%
Double Cut, Hartwell's, ₱ gro.....$5.25%
Double Cut, Douglass'.....40&10%
Double Cut, Ives.....60@60&10%

Hollow Augers—

Ives'..... } 33⅓@33⅓ &10%
French, Swift & Co..... }
Douglass'.....
Bonney's Adjustable, ₱ doz $48.....50%
Stearns'.....20&10%
Ives' Expansive, each $4.50.....50&5%
Universal Expansive, each $4.50.....20%
Wood's.....25@25&10%
Cincinnati Adjustable.....25&10%
Cincinnati Standard.....25&10%

Ship Augers and Bits—

L'Hommedieu's.....15&10@15&10&5%
Watrous'.....25@25&10%
Snell's.....15&10@15&10&5%
Snell's Ship Auger Patt'n Car Bits, 15&10@15&10&5%

Awl Hafts—See *Hafts, Awl.*

Awls—

Awls, Sewing, Common....₱ gr. 85¢@90¢
Awls, Should. Peg.....₱ gr. $1.50@$1.55
Awls, Pat. Peg.....₱ gr. 35¢@38¢
Awls, Shouldered Brad..₱ gr. $1.30@ 1.40
Awls, Handled Brad....₱ gr. $2.50@$3.00
Awls, Handled Scratch..₱ gr. $4.00@4.50
Awls, Socket Scratch..₱ doz. $1.10@$1.20

Awl and Tool Sets—See *Sets, Awl and Tool.*

Axes—

	Plain.		Beveled.
First quality, best brands.	$7.00	@	$7.50
First qual., other brands	6.50 to 6.75	@	7.00
Second quality	5.50		6.00

Axle Grease—See *Grease, Axle.*

Axles—

No. 1....3¼¢@4½¢, No. 2, 5¢@6¢
Nos. 7 to 14.....60&10%
Nos. 15 to 18.....47½% } 3% cash
Nos. 19 to 22.....70% }
Concord Axles, loose collar.....4½¢@6¢
Concord Axles, solid collar.....5½¢@7¢
National Tubular Self Oiling..... 33⅓%@37½%

Bag Holders—See *Holders, Bag.*

Balances—

Spring Balances.....40%

	No. 3000	20	30
Chatillon, ₱ doz.....	$0.80	0.95	1.75 net

Chatillon Straight Balances.....40%
Chatillon Circular Balances.....50&10%

Barb Wire.—See *Wire, Barb.*

Bars—

Crow—

Cast Steel.....₱ ℔ 3½¢
Iron, Steel Points.....₱ ℔ 3¢

Basins, Wash—

Standard Fiberware, No. 1, 10¼ inch, $2; 12-inch, $2.25 13½-inch, $2.75; 15-inch, $3.25.

Beams, Scale—

Scale Beams, List Jan. 12, '82..50&10@50&10&5%
Chatillon's No. 1.....40%
Chatillon's No. 2.....50%
Custer's.....33⅓%

Beaters—

Egg—

Dover.....₱ doz $1.20@$1.50
Duplex (Standard Co.).....₱ doz $1.25
Rival (Standard Co.).....₱ doz $1.00
Duplex Extra Heavy (Standard Co.)....₱ doz. $3.50
Bryant's.....₱ gross $14.00
Double (H. & R. Mfg. Co.), ₱ gro., No. 0 $12.00; No. 1, $15.00; No. 2.....$36.00
Easy (H. & R. Mfg. Co.).....₱ gro $12.00
Triple (H. & R. Mfg. Co.).....₱ gro $16.50
Spiral.....₱ gro $4.25 @ $4.50
Improved Acme (H. & R. Mfg. Co.)....₱ gro. $9.00
Paine, Diehl & Co.'s .....₱ gro. $24.00
Silver & Co.....₱ doz $5.50

Culinary—

Keystone, P. D. & Co., Each, No. 1, $1; No. 2, $2 ... .20%

Bells—

Cow—

Common Wrought.....60&10%
Western, Sargent's list.....70&10%
Kentucky, "Star".....20&10%
Kentucky, Sargent's list.....70&10%
Kentucky Durham.....70&10%
Dodge, Genuine Kentucky....70@70&10%
Texas Star .....50&10@50&10&5%

Door—

Gong, Abbe's.....33⅓&10%
Gong, Yankee.....45&10%
Gong, Barton's.....40&10@50%
Crank, Taylor's.....25&10%
Crank, Brooks'.....50&10&2%
Crank, Cone's.....10%
Crank, Connel's.....20&10%
Lever, Sargent's.....60&10%
Lever, Taylor's Bronzed or Plated....net
Lever, Taylor's Japanned.....25&10%
Lever, R. & E. Mfg. Co.'s. .....50&10&2%
Pull, Brook's.....50&10&2%

Electric—

Wollensak's..... .....20%
Bigelow & Dowse.....20%
Taylor's.....20%

Hand—

Light Brass..... .....70&10@70&10&5%
Extra Heavy.....70%
White.....70%
Silver Chime.....33⅓&10%
Globe Cone's Patent).....25&10@35%

Miscellaneous

Call.....45&50%
Farm Bells.....₱ ℔ 3¢@3½¢
Steel Alloy Church and School Bells..40%

Bellows—

Blacksmiths'.....60&10@60&10&5%
Molders'.....40&10@50%
Hand Bellows.....40&10@50%

Belting, Rubber—

Common Standard.....70@10@75&5%
Standard.....70&5@70&10%
Extra.....60&10@60&10&5%
N.Y.B.&P. Co., Carbon.....60%
N.Y.B.&P.Co., Diamond.....50%
N.Y.B.&P.Co., Para.....40%

Bench Stops—See *Stops, Bench*

Benders and Upsetters, Tire—

Stoddard's Lightning Tire Upsetters..15%
Detroit Perfected Tire Bender.....15%
Green River Tire Benders and Upsetters.....20%

Bits—

Auger, Gimlet, Bit Stock Drills, &c., see *Augers and Bits.*

Bit Holders—See *Holders.*

Blind Adjusters—See *Adjusters, Blind.*

Blind Fasteners—See *Fasteners, Blind.*

Blind Staples—See *Staples, Blind.*

Blocks—

Cleveland Block Co., Mal. Iron.50@50&10%
Moore's Novelty, Mal. Iron.....50%
Sure Grip Steel Tackle Blocks 25%

Bolts—

Carriage, Machine, &c.—

Com. list June 10, '84.....75&10&5@80%
Genuine Eagle, Norway, list Oct. '84.... 80@80&10%
Phila. pattern, list Oct. 7, '84..75&10@80%
R.B.&W., old list.....70%
Machine, list Jan. 1, 1890.....80@80&5%
Bolt Ends, list Jan. 1, 1890..... 75&10@75&10&5%

Door and Shutter—

Cast Iron Barrel, Square, &c.....70&10%
Cast Iron Shutter Bolts.....70&10%
Cast Iron Chain (Sargent's list)....65&10%
Ives' Patent Door Bolts..60&10@90&10&5%
Wrought Barrel.....70@70&10%
Wrought Square.....70@70&10%
Wr't Shutter, all iron, Stanley's...60&10%
Wr't Shutter, Brass Knob.....40&10%
Wr't Shutter, Sargent's list.....60&10%
Wr't Sunk Flush, Sargent's list....60&10%
Wr't Sunk Flush, Stanley's list....50&10%
Wr't B. K.Flush, Co' mr.....55&10%

Stove and Plow—

Stove.....60&1@60&10&5%
Plow.....60&10&50@60&10&10%
R. B. & W., Plow..... .....55%

Tire—

Common, list Feb. 28, '83.....65@65&5%
Port Chester Bolt and Nut Company:
Empire list Feb. 28, '83.....65%
Keystone, Philadel., list Oct. '84.....80%
Norway, Phila., list Oct. '84.....75%
American Screw Company
Norway, Phila., list Oct. 16, '84.....75%
Eagle, Phila., list Oct. 16, '84.....80%
Philadel., list Oct. 16, '84 .....80%
Bay State, list Feb. 28, '83.....65%
R. B. & W., Philadel., list Oct. 16, '84...80%

Borers, Tap—

Common and Ring.....20&10%
Ives' Tap Borers.....33⅓&5%
Enterprise Mfg. Co.....20&10@30%
Clark's.....33⅓@35%

Borax—

Per ℔..... .....9½@10½¢

Boring Machines—See *Machines, Boring.*

Bow Pins—See *Pins, Bow.*

Boxes, Wagon—

Per ℔.....2¾¢

Braces—

American Bit Brace and Tool Co..
Nos. 10, 12, 20.....60&10%
Nos. 11, 21, 24, 27.....70&10%
Nos. 22, 23, 25.....60&10&5%
Nos. 13, 26, 36, 37 .....70&10&5
Ball Braces, net.....$1.12 to $1.25
Amidon's,
Barker's Imp'd Plain.....75&10@80%
Barker's Imp. Nickeled.....65&10@70%
Ratchet.....75&10@80%
Eclipse Ratchet.....60%
Globe Jawed.....40@40&10%
Corner Brace.....40@40&10%
Universal, 8 in., $2.10; 10 in.....$2.25
Buffalo Ball.....$1.10@$1.15
Barber's,
Nos. 10 to 16.....50&10%
Nos. 30 to 33.....50&10%
Nos. 40 to 63.....50&10@50&10&10%
Saxton's,
Barker's Imp. Polished.....75&10@80%
Barker's Imp. Nickeled.....65&10@70%
Ratchet, Polished.....50&10@60%
Ratchet, Nickeled.....40&10@50%
Buffalo Ball.....net, $1.10@$1.15
Bartholomew's,
Nos. 25, 27 and 30.....50&10@60&5%
Nos. 117, 118, 119.....70@70&5%
Common Ball, American.....$1.00@$1.10
Fray's Genuine Spofford s...50&5@50&10%
Fray's Nos. 70 to 120, 81 to 123, 207 to 414 50&10%
Ives' New Haven Novelty.....70@70&5%
New Haven Ratchet.....60&5@60&10%
Barber Ratchet.....60&5@60&10%
Barber's.....60&5%
Spofford.....60&5@60&10%
Osgood's Ratchet.....40&10@50%
P. S. & W. Co., Peck's Patent.....60%

Brackets—

Shelf, plain,
Regular, list.....65@70%
Sargent's list.....60&10@70&10%
Shelf, fancy,
Sargent's list.....70@70&10%
Other makes at a wide range of prices.

Bright Wire Goods—See *Wire.*

Broilers—

Henis' Self-Basting.	Inch.....	9	10	9x11
	Per doz...	$4.50	5.50	6.50

New Haven.....50%
Wire Goods Co.....65&10%
Morgan Odoriess.....₱ doz. $12, 5%

Buckets, Well—

Galvanized—

Hill's.....₱ doz. 12 qt. $4.25; 14 qt. $5.25
Iron Clad.....₱ doz. 14 qt. $4.25@4.50
Helwig's Flat Iron Band.....$3.75
Helwig's Wired Top.....₱ doz $4.00

Bull Rings—See *Rings, Bull.*

Butcher's Cleavers—See *Cleavers, Butchers'.*

Butts—

Brass—

Wrought Brass.....80@80&10%
Cast Brass, Tiebout's.....50%
Cast Brass, Fast.....33⅓&10%
Cast Brass, Loose Joint.....33⅓&10%

Cast Iron—

Fast Joint, Narrow.....50&10&5@60%
Fast Joint, Brond.....50&10@60%
Loose Joint.....
Loose Joint, Japanned.....
Loose Joint, Jap. with Acorns..
Parliament Butts..... 75@75
Mayer's Hinges..... &10%
Loose Pin, Acorns.....
Loose Pin, Acorns, Japanned...
Loose Pin, Acorns, Japanned, Plated Tips.....

Wrought Steel—

Fast Joint, Narrow.....
Fast Joint, Lt. Narrow.....
Fast Joint, Broad..... 75@75
Loose Joint, Broad..... &10%
Table Butts, Back Flaps, &c...
Inside Blind, Regular.....
Indide Blind, Light.....
Loose Pin.....
Bronzed Wrought Butts. .....50@50&10%

Calipers—See *Compasses.*

Calks, Toe—

Gautier, One Prong, Blunt.....5½@6¢
Burke's One Prong, Blunt.....5½@6¢
Burke's, Two Prong, Blunt.....7½@8¢
Burke's, One Prong, Sharp.....6½@7¢

Can Openers—See *Openers, Can.*

Caps—

Percussion—

Hicks & Goldmark's and Union Metallic Cartridge Co. ₱ 1000
F. L. Waterproof, 1-10's.....35@37¢
E. B. Trimmed Edge, 1-10's.....47@50¢
E. B. Grnd. Edge, Cent. Fire, 1-10's.... 47@50¢
Musket, Waterproof, 1-10's.....50@53¢
G. D.....27@30¢
S. B. Genuine Imported.....45¢
Eley's E. B.....50@58¢
Eley's D Waterproof, Central Fire..$1.60

Primers—

Berdan Primers, $1.00.....2%
B. L. Caps (Sturtevant Shells) $1.00....2%
All other Primers, $1.20.....2%

Cards—

Watson's Cotton, Wool, Horse and File, list January 28, 1891.. ..... 25%

Carpet Stretchers—See *Stretchers, Carpet.*

Carpet Sweepers—See *Sweepers, Carpet.*

Cartridges—

Rim Fire Cartridges.....50&5&2%
Rim Fire Military.....15&2%
Cent. Fire, Pistol and Rifle.....25&5&2%
Cent. Fire, Military and Sporting 15&5&2%
Blank Cartridges, except 22 and 32 cal., additional 10% to above discounts.
Blank Cartridges, 22 cal., $1.75.....2%
Blank Cartridges, 32 cal., $3.50.....2%
Primed Shells and Bullets.....15&5&2%
B. B. Caps, Round Ball, $1.75.....2%
B. B. Caps, Con. Ball, Swgd., $2.00.....2%

Casters—

Bed..... } Brass.....55@55&10%
Plate..... } Others....60@60&10%
Shallow Socket...
Deep Socket.....40&10%
Yale Casters, low list.....45%
Yale, Gem.....70%
Martin's Patent (Phenix).45&10@50&10%
Payson's Anti-friction.....70%
Payson's Truck.....60%
Giant Truck Casters.....30%
Stationary Truck Casters.....50&10%
Socket Truck Casters.....50%
Gwinner's Common Sense.....50%
Gwinner's Hercules.....50%

Cattle Leaders—See *Leaders, Cattle.*

Cement—

Victor Elastic.....5 ℔ pails ₱ ℔ 5¢

Chain—

Trace, Wagon and Fancy Chains, List revised Oct. 15, 1892..60@60&10%
American Coil, in cask lots,

3-16	¼	5-16	⅜	7-16	½	⅝	¾
$7.60	5.30	4.45	3.80	3.65	3.50	3.40	3.25

Less than cask lots, add½¢@1½¢ ₱ ℔
German Coil, list July 12, 1892..60@60&5%
German Halter Chain, list July 12, 1892. 60@60&5%
Covert Halter.....60&2%
Covert Traces.....35&2%
Covert Heel Chain.....50&2%
Oneida Halter Chain.....60@60&5%
Galvanized Pump Chain.....₱ ℔ 5½@6¢
Jack Chain, Iron.....80&10%
Jack Chain, Brass.....80%

Chalk—

White, case lots, ₱ gr 50¢; small lots.52¢
Red, case lots....₱ gr 67¢ small lots.72¢
Blue, case lots....₱ gr 75¢; small lots 80¢
See also Crayons

Chalk Lines—See *Lines.*

Chisels—

Socket Framing and Firmer

P. S. & W.
New Haven
Witherby
Mix
Ohio Tool Co. ..75@75&5%
Douglass ..75@75&5%
Buck Bros. ..30%
Merrill ..60&10@60&10&5%
L. & I. J. White ..30@30&5%

Tanged and Miscellaneous.

Tanged Firmers ..40&10@50%
Butchers' ..$4.75@$5.00
Spear & Jackson's ..$5 to £
Buck Bros. ..30%
Cold Chisels, ₱ lb. ..15@16%

Chucks—

Beach Pat. ..each, $8.00 ..20%
Morse's Adjustable, each, $7.00, 20@20&5%
Danbury ..each, $6.00, 30@30&5%
Syracuse, Balz Pat. ..25%
Graham Patent ..33⅓%
Skinner's Patent Chucks.
Combination Lathe Chucks ..33⅓%
Universal Lathe Chucks ..40%
Independent Lathe Chucks ..40%
Drill Chucks ..15%
Union Mfg. Co.
Victor ..$8.50, 25%
Combination ..40%
Universal ..40%
Independent ..40%

Churns—

Tiffin Union, each, 5 gal. $3.25; 7 gal., $3.75; 10 gal., $4.25.
McDermaid Star Barrel Churn, each 6 gal., $2.00; 10 gal., $2.75; 15 gal., $3.00; 20 gal., $3.25.

Clamps—

R. I. Tool Co.'s Wrought Iron ..25%
Adjustable, Cincinnati ..15&10%
Adjustable, Hammers ..15@15&5%
Adjustable, Stearn's ..30@30&10%
Stearn's Adjustable Cabinet and Corner ..30@30&10%
Cabinet, Sargent's ..70&10%
Carriage Makers', Sargent's ..75@75&5%
Carriage Makers', P., S. & W Co. ..40&10%
Eberhard Mfg. Co. ..40&5@40&10%
Warner's ..40&10@40&10&5%
Saw Clamps, see Vises, Saw Filers'.
Carpenter's, Cincinnati ..25&10%

Cleavers, Butchers'—

Bradley s ..25@30%
L. & I. J. White ..20&5%
Beatty's ..40@40&5%
New Haven Edge Tool Co.'s ..40%
P., S. & W. ..33⅓&5@33⅓&10%
Foster Bros. ..30%
Schulte, Lohoff & Co. ..40@40&5%

Clips—

Norway, Axle, ¼ & 5-16 ..55&5&5%
2d grade Norway Axle, ¼ & 5-16 ..65&5%
Superior Axle Clips ..60@60&5@70%
Norway Spring Bar Clips, 5-16 ..60&5&5%
Wrought Iron Felloe Clips ..₱ lb., 5½¢
Steel Felloe Clips ..₱ lb., 5¢
Baker Axle Clips ..25%

Cloth and Netting, Wire
—See *Wire, &c.*

Cockeyes ..50%

Cocks Brass—

Hardware list ..60@2%

Coffee Mills—See *Mills, Coffee.*

Collars, Dog—

Chapman Mfg. Company ..50@10@60%
Medford Fancy Goods Co. ..40@10@50%
Embossed, Gilt, Pope & Steven's list, 30&10%
Leather, Pope & Steven's list ..40%
Brass, Pope & Steven's list ..40%

Combs, Curry—

Fitch's ..50@10@50&10&10%
Rubber, per doz., $10.00 ..25%
American Curry Comb Co. ..33⅓@40%
Kohler's Magic Oscillating. ₱ doz., $2.00
Kohler's Humane ..₱ doz., $1.75

Compasses, Dividers, &c.

Compasses, Calipers, Dividers. 70@70&10%
Bemis & Call Co.'s
Dividers ..65%
Compasses ..50&5%
Calipers, Wing and Inside or Outside. 50&5%
Calipers, Double ..60%
Calipers, Call's Patent Inside ..30%
Excelsior ..50%
J. Stevens & Co.'s ..25&10%
Starrett's
Spring Calipers and Dividers ..25&10%
Lock Calipers and Dividers ..25%
Combination Dividers ..25%

Coopers' Tools—
See *Tools, Coopers'.*

Cord—

Sash—

Common ..₱ lb., 10@11¢
Patent, good quality ..₱ lb., 12@12½¢
White Cotton Braided, fair, ₱ lb., 24½@25¢
Common Russia Sash ..₱ lb., 12½@13¢
Patent Russia Sash ..₱ lb., 14¢
Cable Laid Italian Sash ..₱ lb., 21@22¢
India Cable Laid Sash ..₱ lb., 12¢
Silver Lake—
A quality, White, 50¢ ..25%
A quality, Drab, 55¢ ..25%
B quality, White, 30¢ ..10%
B quality, Drab, 35¢ ..10%
Sylvan Spring, Extra Braided, White. 34¢
Sylvan Spring, Extra Braided, Drab. 39¢
Semper Idem, Braided, White. ..27@28¢
Egyptian, India Hemp, Braided ..26¢
Massachusetts, White ..26¢
Samson—
Braided, White Cotton 50¢. 30@30&5%
Braided, Drab Cotton, 55¢. 30@30&5%
Braided, Italian Hemp, 55¢. 30@30&5%
Braided, Linen, 80¢ ..30@30&5%
Tate's Cotton Braided, White, ₱ lb., 28¢. 10%
Ossawan Mills—
Braided, Giant, White, ₱ lb., 30¢. ..20%
Braided, Giant, Drab and Fancy, ₱ lb., 35¢ ..10%
Braided, Crown, White, ₱ lb., 50¢. ..50%
Braided, Crown, Drab and Fancy, ₱ lb. 55¢ ..30%

Wire Picture—

Braided or Twisted ..80&5@80&15%

Corkscrews—See *Screws, Cork.*

Corn Knives and Cutters
—See *Knives, Corn.*

Crackers, Nut—

Table (H. & B. Mfg. Co) ..40%
Blake's Pattern, ₱ doz., $2.00 ..10%
Turner & Seymour Mfg. Co. ..50%
Acme.
Japanned, ₱ gro., $30 ..50%
Nickel Plated, ₱ gro. $30 ..10%

Cradles—

Grain ..50&5&2@50&10&2%

Crayons—

White Crayons, ₱ gross ..7@8¢
D. M. Stewart Mfg. Co., Metal Workers', ₱ gross, $2.50 ..25%
D. M. Stewart Mfg. Co., Rolling Mill, ₱ gross, $2.50 ..25%
See also *Chalk.*

Crow Bars—See *Bars, Crow.*

Curry Combs—
See *Combs, Curry.*

Curtain Pins—
See *Pins, Curtain.*

Cutters—

Meat—

Dixon's, ₱ doz.
Nos. 1 2 3 4
$14.00 $17.00 $19.00 $30.00
Woodruff's, ₱ doz. ..40&5%
Nos. 100 150
$15.00 $18.00
Hale's Pattern, ₱ doz. ..70@70&5%
Nos. 11 12 13
$27.00 $33.00 $45.00
American ..30%
Nos. 1 2 3 4 B 5
Each ..$5 $7 $10 $25 $50 $60
Enterprise ..30%
Nos. 10 12 22 32 42
Each ..$3 $2.50 $4 $6 $15
Great American Meat Cutter ..30@30&5%
Nos. 112 116 118 120 122
Each ..$2.00 $2.75. $3.00 $3.50 $4.00
Miles' Challenge, ₱ doz. ..45@45&10%
Nos. 2 3
$22.00 $30.00 $40.00
Home No. 1, ₱ doz., $36.00 ..55&10%
Draw Cut, each:
Nos. 5 2 6 8
$50 $75 $80 $225 ..20@25%
Beef Shavers (Enterprise) ..20@10@30%
Little Giant (P. S. & W. Co.) ..50%
Chadborn's Smoked Beef Cutter, ₱ doz., $66.00

Tobacco

Champion ..20@10@30%
All Iron ..₱ doz., $4.25
Nashua Lock Co.'s, ₱ doz., $18.00, 50@55%
Wilson's ..55%
Sargent's ..₱ doz., $24.00, 55&10
Acme ..₱ doz., $20.00, 40%

Washer—

Smith's Pat. ..₱ doz., $12.00, 20@10@10%
Johnson's ..₱ doz., $11.00, 33⅓%
Penny's, ₱ doz., Pol. $14; Jap'd, $16, 55%
Appleton's ..₱ doz., $16.00, 60@10%
Bonney's ..30@10%
Cincinnati ..25&10%

Dampers, &c.—

Dampers, Buffalo ..40&10%
Buffalo Damper Clips ..40&10%
Crown Damper ..40%
Excelsior ..40&10%

Diggers, Post Hole, &c.—

Samson, ₱ doz., $34.00 ..25%
Fletcher Post Hole Augers, ₱ doz., $36.00, 20%
Eureka Diggers ..₱ doz., $11.50@$12.50
Leed's ..₱ doz., $8.00@$9.00
Vaughan's Post Hole Auger, ₱ doz., $8.50@$9.50
Kohler's Little Giant ..₱ doz., $18.00
Kohler's Hercules ..₱ doz., $14.00
Kohler's Invincible ..₱ doz., $12.00
Kohler's New Champion ..₱ doz., $8.00
Scheidler ..₱ doz., $18.00
Ryan's Post Hole Diggers ..₱ doz., $24.00
Cronk's Post Bars, ₱ doz., $60.00, 50&5&50&10%
Gibb's Post Hole Digger ..₱ doz., $15.00
Gibbs' National ..₱ doz., $12.00
Gibbs' Columbia ..₱ doz., $13.00
Gibbs' Imperial ..₱ doz., $7.50
Shimer's Hollow Handle ..₱ doz., $24.00, 50%

Dividers—See *Compasses.*

Dog Collars—See *Collars, Dog.*

Door Springs—
See *Springs, Door.*

Drawers.

Money, ₱ doz ..$18@$20

Drawing Knives—
See *Knives, Drawing.*

Drills and Drill Stocks—

Blacksmiths' ..each $1.75
Blacksmiths' Self-Feeding, each $7.50, 50%
Breast, P. S. & W ..40&10%
Breast, Wilson's ..30&5%
Breast, Millers Falls ..each $3.00, 25%
Breast, Bartholomew's ..each $2.50 25&10&40%
Ratchet, Merrill's ..20@20&5%
Ratchet, Ingersoll's ..25%
Ratchet, Parker's ..20@20&5%
Ratchet, Whitney's ..30&10%
Ratchet, Weston's ..20@25%
Ratchet, Moore's Triple Action ..25@30%
Ratchet, Curtis & Curtis ..30%
Whitneys Hand Drill, Plain, $11.00; Adjustable, $12.00 ..20&10%
Wilson's Drill Stocks ..10%
Automatic Boring Tools ..$1.75@$1.85
Chicopee Automatic Drill ..20&10%

Twist Drills—

Cleveland ..50&10&10%
Diamond, W. & B ..50&10&10%
Graham's Pat. Groove Shank ..50&10&10%
Morse ..50&10&10%
New Process ..50&10&10%
Standard ..50&10&10%
Syracuse (Meta list) ..50&10%

Drill Bits or Bit Stock Drills—See *Augers and Bits.*

Drill Chucks—See *Chucks.*

Dripping Pans—
See *Pans, Dripping.*

Drivers, Screw—

Douglass Mfg. Co. ..20@20&10%
Diston's ..50%
Buck Bros. ..30%
Stanley R. & L. Co.'s
No. 64, Varnished Handles ..65&10%
No. 86 ..70&10%
Sargent & Co.'s
No. 1, Forged Blade ..60&10&10%
Nos. 20, 40 and 60 ..60&5&10&10%
P. S. & W. ..70%
Knapp & Cowles
No. 1 ..60@20@70%
No. 2 ..60&10&10@70&5%
No. 3 ..60&5@60&10%
Nos. 4 and 00, Acme and Ideal ..50&5@50&10&5%
Stearns' ..25&10&5%
Gay & Parsons ..35%
Champion ..25&10%
Clark's Pat ..30@33⅓&5%
Crawford's Adjustable ..30%
Ellrich's Socket and Ratchet ..25@25&10%
Allard's Spiral, new list ..25%
Kolb's Common Sense ..₱ doz., $6.00, 25&10%
Syracuse Screw-Driver Bits ..30&30&5%
Screw Driver Bits ..₱ doz., 50@75¢
Screw Driver Bitts, Parr's ..₱ gross, $6.25
Fray's Hol. H'dle Sets ..No. 3, $12.00, 45%
P. D. & Co.'s All Steel ..50%
Cincinnati ..25&10%
Brace Screw Drivers ..25&10%
Buck Bros.' Screw Driver Bits ..27½&5%
Goodell's Automatic ..50%
Mayhew's Black Handle ..50%
Mayhew's Monarch ..45&10%
C. T. Williamson Wire Novelty Co. ..50%

Egg Beaters—See *Beaters, Egg.*

Egg Poachers—
See *Poachers, Egg.*

Electric Bell Sets—
See *Bells, Electric.*

Emery—No. 4 to No. 54 to Flour, CF, FF.

	46 gr.	150 gr.	F.FF.
Kegs, ₱ lb.	4½¢	5 ¢	2½¢
½ kegs, ₱ lb.	4½¢	5½¢	2¾¢
¼ kegs, ₱ lb.	5 ¢	5½¢	3 ¢
10-₱ cans, 10 in case	6 ¢	6¼¢	5 ¢
10-lb cans, less than 10	10 ¢	10 ¢	7½¢

Enameled and Tinned Ware—See *Ware, Hollow.*

Escutcheon Pins—
See *Pins, Escutcheon.*

Escutcheons—

Door Lock ..Same dis. as Door Locks.
Brass Thread ..60@60&10%
Wood ..25%

Expanded Metal—

List No. 5.

Lathing ..10%
Fencing, Painted Sheets ..20%
Netting, Painted Sheets ..20%
Door Mats, Galvanized ..25%
Window Guards, Paneled ..15%
Tree Guards, Paneled ..15%

Extractors, Lemon Juice
—See *Squeezers, Lemon.*

Fasteners, Blind—

Mackrell's, ₱ doz., $1.00 ..20@20&10%
Van Sand's Screw Pat, $15 ₱ gr.. 60&10%
Van Sand's Old Pat., $15 ₱ gr. ..55&10%
Austin & Eddy No. 2008 ..₱ gr., $9.00
Security Gravity ..₱ gr., $9.00
Zimmerman's ..50%

Faucets—

Fenn's ..40%
Bohren's Pat. Rubber Ball ..25%
Fenn's Cork Stops ..33⅓%
Star ..50%
Frary's Pat. Petroleum ..60%
B. & L. B. Co.
West's Lock, Open and Shut Key ..50%
Star, Metal Plug, new list ..40%
Lockport, Metal Plug, reduced list. 60%
Metallic Key, Leather Lined ..60&10@60&10&10%
Cork Lined ..70&5@70&10%
Burnside's Red Cedar ..50%
Burnside's Red Cedar, bbl. lots ..50&10%
John Sommers'
Peerless Best Block Tin Key ..40%
IXL, 1st quality, Cork Lined ..50%
Diamond Lock ..40%
Perfection, Fla. Red Cedar ..50%
Goodenough Cedar ..50%
Boss Metallic Key ..50%
Reliable Cork Lined ..60%
Western Pattern Cork Lined ..50%
Self Measuring
Enterprise, ₱ doz., $36.00 ..&10%
Lane's ₱ doz., $36.00 ..25&10%
Victor ..₱ doz., $36.00 25&10%

Felloe Plates—
See *Plates, Felloe.*

Fifth Wheels—

Derby and Cincinnati ..45&5%
Brewster ..50&5%

Files—

Domestic—

Nicholson Files, Rasps, &c. 60&10&5@60&10&10%
Nicholson (X.F.) Files ..25%
Nicholson's Royal Files (Seconds) ..75% (extra prices on certain sizes.)
American ..60&5&10@60&5&10&2%
G. & H. Barnett (Black Diamond) 60&10@60&10&5%
Arcade ..60&10&10@70%
Eagle ..60&10&10@70%
Other makers, best brands ..60&10&5@70%
Fair brands ..70@70&10%
Second quality ..75@75&10&5%
Heller's Horse Rasps ..50&7½@50&10%
McCaffrey's Horse Rasps ..50&10%
Chelsea Horse Rasps, Hand Cut. 50&10@50&10&5%
Arcade Horse Rasps ..60&10@60&10&5%

Imported—

Butcher ..Butcher's list, 20%
Stubs ..Stubs list, 25@30%

Fixtures, Grindstone—

Sargent's Patent ..70&10%
Reading Hardware Co. ..30&10%
P., S. & W. Co. ..50&10%

Fluting Machines—
See *Machines, Fluting.*

Fluting Scissors—
See *Scissors, Fluting.*

Fodder Squeezers—
See *Squeezers, Fodder.*

Forks—

Hay, Manure, &c. Asso. List. 70@70&5&2%
Hay, Manure, &c., Phila. List, 60@60&10&2%
Plated, see Spoons.

Frames—

Saw—

White Vermont ..₱ gro., $9.00@$10.00
Red, Polished and Varnished ..₱ doz., $1.50, 25%

Screen, Window and Door—

Porter's Pat. Window and Door Frame, 33⅓&10%
Warner's Screen Corner Irons ..33⅓@33⅓&10%
Stearns' Frames and Corners. 25@25&10%
Cortland ..40@40&5

Freezers, Ice Cream—

White Mountain ..60@60&5%
Granite State ..65@65&5%
Arctic ..70@70&5%
American ..60%
Buffalo Champion ..65@65&5%
Shepard's Lightning ..65@65&5%
Gem ..65%
Blizzard ..70%
Double Action Crown ..60%
Crown ..60%
Star ..60%
Peerless ..60@10%
Giant ..60%
Zero ..60@10&10%
Boss and Pet ..60@10&10&10%
Keystone, P., D. & Co., each, $1.50 ..20%
Standard ..60@60&5%
Standard Double Action ..60@60&5%
Expert ..65@65&5%
Model ..60@60&5%
Confectioners' Machine ..50%

Fruit and Jelly Presses—
See *Presses, Fruit and Jelly.*

Fry Pans—See *Pans, Fry.*

Funnels—

Gersdorff's Perfection, Standard and Globe; *Tin*, 1 gro., 10%; 2 to 5 gro., 20%; 5 to 10 gro. ..30%
Copper, 1 to 6 doz., 15%; 6 to 12 doz., 30%; over 12 doz. ..25%

Furnaces, Soldering—

Burgess No. 3 Gem tin reservoir ..$7.00
Burgess No. 3 Gem, Copper reservoir. $8.50

Fuse—Dis. 12½@15%. ₱ 1000 ft.

Common Hemp Fuse, for dry ground. $2.70
Common Cotton Fuse, for dry ground 2.85
Single Taped Fuse, for wet ground.. 3.85
Double Taped Fuse, for very wet gr.. 4.80
Triple Taped Fuse, for very wet gr.. 5.60
Small Gutta Percha Fuse, for water. 7.50
Large Gutta Percha Fuse, for water. 12.00

Gates Molasses—

Stebbin's Pattern ..80@80&5%
Stebbin's Genuine ..60@10&10%
Stebbin's Tinned Ends ..40&10%
Chase's Hard Metal ..50&10%
Bush's ..20%
Lincoln's Pattern ..70@70&10%
Weed's ..20&10%
Boss, ₱ doz.:
No. 1, $7; No. 2, $8; No. 3, $9; No. 4, $10 ..60&10&10%

Gauges—

Marking, Mortise, &c ..60&10%
Starrett's Surface, Center and Scratch. 25&10%
Stanley R. & L. Co.'s Butt and Rabbet Gauge ..20&10%
Hoague & Peck's Champion Gauge—
With Scale ..₱ doz., $5.00
Without Scale ..₱ doz., $4.00
Wire, Wheeler, Madden & Co. ..10%
Wire, Morse's ..25%
Wire, Brown & Sharpe s ..10@20%
Wire, P., S. & W. Co. ..10&10%

Gimlets—

Nail and Spike ..50&10&5%
Eureka Gimlets ..60&10%
Diamond Gimlets ..₱ gr $5.00
Double Cut, Shepardson's ..45@45&5%
Doub e Cut, Ives' ..60@60&5%
Doub.e Cut, Douglass' ..40&10%

Glue—

Ie Page's Liquid ..25@25&5%
Upton's Liquid ..35%
Improved Process ..25@25&5%
Dodd's Liquid Glue ..25@25&5%

Glue Pots—See *Pots, Glue.*

Grease, Axle—

Fraser's ..Keg ₱ lb 4¢, Pail ₱ lb 5¢
Fraser's, in boxes ..₱ gr $9.50
Dixon's Everlasting, in bxs., ₱ doz 1 lb $1.20; 2 lb $2.00
Dixon's Everlasting. ..10-lb pails, ea. 85¢
Lower grades, special brands.
₱ gr $5.50@$7.00
Axleine, tin boxes ..₱ gross $12.00
English Coach, wooden boxes ..₱ gross $8.50
English Coach, 5-lb tin pails. ₱ doz. $3.50
Tiger, wooden boxes ..₱ gross $7.00
Tiger, 5-lb tin pails ..₱ doz $2.85

Grindstones—

Small, less than car load lots at quarry ..₱ ton $9.00 @ $10.00
Family, regular list ..60%
Family, Cleveland Stone Co. ..20%

Grindstone Fixtures—
See *Fixtures, Grindstone.*

Gun Powder—See *Powder.*

Hack Saws—See *Saws.*

Hafts, Awl—

Sewing, Brass Fer. ₱ gr. ..$1.75
Pat. Sewing, Short. ₱ doz. ..45@50%
Pat. Sewing, Long ..₱ doz $1.20
Pat. Peg, Plain Top. ₱ doz ..40@45%
Pat. Peg, Leather Top ..₱ doz 48@50%

Halters—

Covert's, Rope, Jute.....60&10&10&2%
Covert's Rope, 7-16-in., Jute.....70&2%
Covert's Rope, ½-in., Hemp.....50&2%
Covert's Adj. Rope Halters.....40&2%
Covert's Hemp Horse and Cattle Tie.....50&2%
Covert's Jute Horse Ties.....70&2%
Covert's Jute Cattle Ties.....70&10&2%
Covert's Adj. Web Halters.....35&5&2%
Covert's Saddlery Works Halters...33⅓%
Covert's Saddlery Works Horse and Cattle Ties.....33⅓%

Hammers—

Handled Hammers—

Maydole's, list Dec. 1, '85.....25&10@35%
Buffalo Hammer Co.
Humason & Beckley.....
Atha Tool Co.....
Verree.....
C. Hammond & Son.....40&10@—%
Fayette R. Plumb.
Artisans' Choice, A. E. Nail.....40&10%
Regular Y. & P., A. E. Nail.....50%
Horseshoe Turning Hammers.....50%
Other Hammers.....50&10%
Cheney's Claw.....40&10%
Cheney's Machinist's & Riveting...50&5%
Hartford, Nail Hammers.....40&10%
Hartford, Machinists, &c..50&5@50&10%
Magnetic Tack, Nos. 1, 2, 3, $1.25, 1.50 & 1.75.....30&10%
Nelson Tool Works.....40&10%
Warner & Nobles, new list.....25&10
Peck, Stow & Wilcox.....40&10@50%
Sargent's.....40@40&10%

Heavy Hammers and Sledges—

3 ℔ and under...℔ ℔40¢ } 75&10@75&10
3 to 5 ℔.....℔ ℔36¢ } &5%
Over 5 ℔.....℔ ℔30¢ }
Wilkinson's Smiths.....10½@11¢℔ ℔

Handcuffs and Leg Irons

—See *Police Goods.*

Handles—

Cross-Cut Saw Handles—

Atkins' No. 1 Loop, ℔ pr., 28¢; No. 3, 18¢; No. 6, 15¢; No. 2 and No. 4, Reversible, 18¢.
Champion.....15%

Iron, Wrought or Cast—

Door or Thumb.

Nos.	0	1	2	3	4
Per doz.	$0.90	1.00	1.08	1.35	1.50

60&10&10%
Roggin's Latches.....℔ doz 30@35¢
Bronze Iron Drop Latches..℔ doz 70¢ net
Jap'd Store Door Handles—Nuts, $1.62; Plate, $1.10; no plate, $0.88.....net
Barn Door, ℔ doz $1.40.....10&10%
Chest and Lifting.....70@70&10%

Wood—

Saw and Plane.....40&10@50%
Hammer, Hatchet, Axe, &c.....40@40&5%
Brad Awl.....℔ gr $2.00
Hickory Firmer Chisel, ass'd..℔ gr 4.50 } 50%
Hickory Firmer Chisel, large..℔ gr 5.00 }
Apple Firmer Chisel, ass'd...℔ gr 5.00 } 40&10@40&10%
Apple Firmer Chisel, large...℔ gr 6.00 }
Socket Firmer Chisel, ass'd..℔ gr 3.00 }
Socket Framing Chisel, ass'd.℔ gr 5.00 }
J. B. Smith & Co.'s Pat File.....50%
File, assorted.....℔ gr 2.75 }
Auger, assorted.....℔ gr 5.00 } 50%
Auger, large.....℔ gr 7.00 }
Pat. Auger, Ives'.....30&10%
Pat. Auger, Douglass.....℔ set $1.25
Pat. Auger, Swan's.....℔ set $1.00
Hoe, Rake, Shovel, &c.....60@60&5%

Hangers—

Barn Door, old patterns...60&10&10@70%
Barn Door, New England..60&10&10@70%
Samson Steel Anti-Friction.....55%
Orleans Steel.....55%
Hamilton Wrought Steel Track.....55%
U. S. Wood Track.....65%
Champion.....60&10%
Rider and Wooster, Medina Mfg. Co.'s list.....70%
Climax Anti-Friction.....55%
Climax Anti-Friction for Wood Track.55%
Zenith for Wood Track.....55%
Reed's Steel Arm.....50%
Challenge, Barn Door.....50%
Sterling.....50&5&10%
Victor, No. 1, $15.00; No. 2, $16.50; No. 3, $18.00.....50&2%
Cheritree.....50&10%
Kidder's.....40&10@50%
Boss.....60&10%
Best Anti-Friction.....60&10%
Duplex (Wood Track).....60&10&5%
Terry's Pat., ℔ doz pr. 4 in., $10.00; 5 in. $12.00.....50&10%
Terry's Steel Anti-Friction Leader.50&10%
Terry's Steel Anti-Friction Ideal..50&10%
Cronk's Patent, Steel Covered.....50&5%
Wood Track Iron Clad, ℔ ft. 10¢.....50 &15@60%
Carrier Steel Anti-Friction.....50&10%
Architect, ℔ set $6.00.....20%
Eclipse.....20&10%
Felix, ℔ set $4.50.....20%
Richards'.....30&30&10%
Lane's New Standard.....50@50&5%
Lane's Standard.....50&5@50&10%
Lane's Parlor.....40%
Ball Bearing Door Hanger.20&10@25&10%
Warner's Pat.....20&10@20&10&10%
Stearns' Anti-Friction..20&10@20&10&10%
Stearns' Challenge.....25&10@25&10&10%
Faultless.....40@40&5%
American, per set $6.00.....20&10%
Rider & Wooster, No. 1, 63¾¢; No. 2, 75¢.....40%
Paragon, Nos. 1, 2 and 3.....40&10%
Cincinnati.....25&10%
Paragon, Nos. 5, 5¼, 7 and 8.....20&10%
Crescent.....60@60&10%
Nickel, Steel, Nos. 0, $25; 1, $20; 2, $15. 20&10%
Scranton Anti-Friction Single Strap.33⅓%
Wild West, 4 in. Wheel, $15.00; 5 in. Wheel, $21.00.....45%
Star.....40&10@40&10&5%
May.....50&5@50&10%
Barry, $6.00.....40&10%
Interstate.....50%
Magic.....45%
Pendulum, Payson's.....40%
Moody.....45%

Harness Snaps—See *Snaps.*

Hatchets—

American Axe and Tool Co.
Blood's.....
Hunt's.....
Hurd's.....
Mann's.....
Peck's.....
Underhill's.....
Buffalo Hammer Co.....
Fayette R. Plumb.....
C. Hammond & Son.....
Kelly's.....
Sargent's & Co.....
P., S. & W. Co.....
Ten Eyck Edge Tool Co.....
Collins.....
Schulte, Lohoff & Co.....
} 40 & 10 @ 50&5%
.....10%
.....50@50&5%

Hay and Straw Knives—

See *Knives.*

Hinges—

Blind Hinges—

Parker.....75&2%
Huffer.....50%
Clark's, Nos. 1, 3, 5, 40 and 50..80@80&5%
Clark's Mortise Gravity.....50%
Sargent's, Nos. 1, 3, 5, 11, 12, 13..75@75&10%
Reading's Gravity.....75&10@75&10&5%
Shepard's.
Nobleless.....75&10%
Niagara.....80%
Buffalo.....80%
Clark's Genuine Pattern.....80%
O. S., Lull & Porter.....75&10%
Acme, Lull & Porter.....75%
Queen City Reversible....70&10&5@75%
Clark's, Lull & Porter, Nos. 0, 1, 1½, 2, 2½, 3.....75&10&2½%
North's Automatic Blind Fixtures, No. 2, for Wood, $9.00; No. 3, for Brick, $11.50.....10%

Gate Hinges—

Western.....℔ doz $4.20, 60@60&10%
N. E.....℔ doz $7.80, 60@60&10%
N. E. Reversible ℔ doz..$5.60, 6 @60&10%
Clark's, No. 1 ,2, 3.....60&10&5%
N. Y. State.....℔ doz $4.90,60@60&10%
Automatic.....℔ doz $12.50, 50%
Shepard's.....60&10&5%

Spring Hinges—

Geer's Spring and Blank Butts...40%
Union Spring Hinge Co.'s list, March, 1886.....20%
Barker's Double Acting.....25%
Union Mfg. Co.....25%
Bommer's.....30%
Buckman's.....15@20%
Chicago.....30%
Bardsley's Patent.....40%
Acme.....30%
U. S.....25&10%
Empire and Crown.....20%
Hero and Monarch.....55%
American, Gem and Star.....20%
Oxford.....20%
Wiles'.....10%
Devore's.....40%
Rex.....40%
Royal.....66⅔%
Reliable.....60%
Champion.....60%
No. 10 Matchless.....50&10%
No. 15 Unbreakable.....50&10%
J. G. C. Covered, ℔ gro., $30.....50&5%
Samson, ℔ gross.....$14.00

Extra 5@10% often given.

Wrought Iron Hinges—

List February 14, 1891.
Strap and T.....50&10@50&10&5%
Corrugated Strap and T.....50&10&5%
Screw Hook and Strap... { 6 to 12 in., ℔ ℔.. 4¢ / 14 to 20 in., ℔ ℔..3½¢ / 22 to 36 in., ℔ ℔.. 3¢
Screw Hook and Eye.... { ⅝ in., ℔ ℔ 7¼¢ / ½ in., ℔ ℔ 5¾¢ / ⅜ in., ℔ ℔ 4¾¢
Rolled Blind Hinges, Nos. 32 and 34 .....50&10%
Rolled Blind Hinges, Nos. 232 and 234 .....55&10%
Rolled Plate.....70&10%
Rolled Raised.....70&10¢
Plate Hinges { 8, 10 & 12 in., ℔ ℔.....5¢ / "Providence" { over 12 in. ℔ ℔.....4¢

Hoes—

Eye—

D. & H. Scovil.....20%
Lane's Crescent, Planters' Pattern.45&5%
Lane's Razor Blade, Scovil Pattern...30%
Maynard, S. & O. Pat.....45&5%
Sandusky Tool Co., S. & O. Pat. } 70@70&
Am. Axe and Tool Co., S. & O. Pat. } 5%
Chattanooga Tool Co., S. & O. Pat. .60& 5@60&10%
Grub.....60&10%

Handled—

Garden, Mortar, &c.....70@70&5&2%
Planter's, Cotton, &c.....70@70&5&2%
Warren Hoe.....60@60&5%
Magic.....℔ doz $4.00

Hog Rings and Ringers—

See *Rings and Ringers—*

Hoisting Apparatus—

See *Machines, Hoisting.*

Hollow-Ware—

See *Ware, Hollow.*

Holders—

Bag—

Sprengle's Pat.....℔ doz $18....60%

Bit—

Extension.
Barber's, ℔ doz $15.00.....40@40&10%
Ives, ℔ doz $20.00.....60&5@60&10%
Diagonal.....℔ doz $24.00, 40%
Angular.....℔ doz $24.00, 40&5%

File and Tool—

Bais Pat.....℔ doz $4.00, 25%
Nicholson File Holders.....20%
Dick's Tool Holder.....20%

Hooks—

Cast Iron—

Bird Cage, Sargent's List.... } 60&10&10%
Bird Cage, Reading.... }
Clothes Line, Sargent's list . } 60&10@60&10&10%
Clothes Line, Reading list }
Ceiling, Sargent's list.....55&10&10%
Harness, Reading list..55&10@55&10&10%
Coat and Hat, Sargent's list. 55&10@60&10%
Coat and Hat, Reading. 50&10@50&10&10%

Wrought Iron—

Cotton.....℔ doz $1.25
Cotton Pat. (N. Y. Mallet and Handle W'ks.....30%
Tassel and Picture, T. & S. Mfg.Co....50%
Wrought Staples, Hooks, &c.
See Wrought Goods

Wire—

Wire Coat and Hat, Gem, list April, 1886.....60@60&10
Wire Coat and Hat, Miles, list April, 1886.....50@50&10%
Indestructible Coat and Hat...45@45&5%
Wire Coat and Hat, Standard.60@60&10%
Handy Hat and Coat.....50&10@60%
Steady Ceiling Hooks.....50&10@60%
Belt.....80@80&10%
Atlas, Coat and Hat.....60@60&10%
Williamson's Bird Cage Hooks, List April, 1892.....40%
Bright Wire Goods—See Wire.

Miscellaneous—

Grass, No. 2, $2.00; No. 3, $2.10; No. 4, $2.25
Nolin's Grass.....℔ doz $2.25
Bush.....55@60%
Whiffletree—Patent.....55%
Hooks and Eyes—Malleable Iron. 70@70&10%
Hooks and Eyes—Brass.....60@10&10%
Fish Hooks, American.....50%
Bench Hooks—See Bench Stops.

Horse Nails—See *Nails, Horse*

Horse Shoes—

See *Shoes, Horse.*

Hose, Rubber—

Competition.....75@75&10&5%
Standard.....60&10&10@70&10%
Extra.....60@60&10%
N. Y. B. & P. Co., Para.....25&5%
N. Y. B. & P. Co., Extra.....40@40&5%
N. Y. B. & P. Co., Dundee.....50&10@60%

Huskers—

Blair's Adjustable.....℔ gr $8.00
Blair's Adjustable Clipper..℔ gr 7.00
Hubbard's Solid Steel.....℔ gr 4.50

Indurated Fiber Ware—

See *Ware, Indurated Fiber.*

Irons.

Sad—

From 4 to 10, at factory....℔ 100 ℔. $2.30@$2.40
Self-Heating.....℔ doz $8.00
Self-Heating, Tailors'.....℔ doz $18.00
Mrs. Pott's Irons.....60@60&10%
Enterprise Star Irons.....60@60&10%
XX Cold Handle Sad Iron....60@60&10%
Ideal Irons, new list...50&10@50&10&10%
Salamander Irons.....25%
B. B. Sad Irons, ℔ ℔.....3@3¼¢
Combined Fluter and Sad Iron, ℔ doz. $15.00.....15%
Fox Reversible Self-Fluter, ℔ doz..$24.00
Chinese Laundry (N.E.Butt Co.).8½¢, 15%
New England.....5¢, 15%
Mahony's Troy Pol. Irons.....25%
Sensible, list Jan. 91.....50&10&5%
Sensible Tailor's Irons.....33⅓%
National Self-Heating.....30%

Soldering—

Soldering Coppers.....℔ ℔ 19@21¢
Covert's Adjustable, list Jan. 1, 1886. 35&2%

Pinking—

Pinking Irons, ℔ doz., 55@60¢

Jack Screws—See *Screws.*

Jacks, Wagon—

Daisy.....33⅓%
Victor.....33⅓%
Lockport.....40%

Kettles—

Brass, Spun, Plain, list Jan. 1, '91..25&5%
Brass, Spun, Pld.W.M.list Jan. 1, '91..20%
Enameled and Tea—See *Ware, Hollow.*

Keys—

Lock, Ass'n list Dec. 30, 1886.50&10@ 60&5%
Eagle, Cabinet, &c.....33⅓&2%
Hotchkiss' Brass Blanks.....40%
Hotchkiss' Copper and Tinned.....40%
Hotchkiss' Pad. and Cab.....35%
Ratchet Bed Keys.....℔ doz. $4.00, 15%
Wollensak Tinned.....50&10%

Knife Sharpeners—

See *Sharpeners, Knife.*

Knives—

Butcher, Shoe, &c.

Wilson's Butcher Knives, List Dec 8, 1890.....25%
Ames' Butcher Knives.....25%
Foster Bros.' Butcher, &c.....40%
Jordan's Aa Al Butchers', list.....net
Nichols' Butcher Knives.....40&10%
W. W. Wilson, Butcher, 6 in., $2.00; 7 in., $2.70; 8 in., $3.80, &c.
Ames' Shoe Knives.....20@25%
Ames' Bread Knives, ℔ doz $1.50, 15@20%
Moran's Shoe and Bread.....20@20&10%
Hay and Straw—See Hay Knives.
Table and Pocket—See Cutlery.

Corn—

Auburn Mfg. Co. Western Pat.....$2.00
Auburn Mfg. Co. Crescent.....$3.50
Bradley's.....10%
Wadsworth's.....25@25&10%

Drawing—

Witherby..... } .....75@75&10&5%
P., S. & W..... }
Mix..... }
New Haven..... }
Merrill.....60&10@60&10&5%
Douglass.....75&75@5%
Watrous.....15&10@25%
L. & I. J. White.....20&5%
Bradley's.....35%
Adjustable Handle.....25@33⅓%
Wilkinson's Folding.....25@25&10%

Hay and Straw—

Lightning, from jobbers....$8.00@$9.60
Wadsworth's.....40&7½@40&10%
Carter's Needle...℔ doz. $11.00@$11.50
Heath's.....℔ doz. $13.00@$13.70
Auburn Hay, Com. and Spear Point..5%
Auburn Straw.....4%
Nolin's Hay.....℔ doz. $7.00@$8.00

Mincing—

.Am. (2d quality), ℔ gr., 1 blade, $7; 2 blades, $12; 3 blades, $18.....net
Lothrop's.....20&10%
Smith's, ℔ doz., Single, $2; Double $3 45@50%
Knapp & Cowles.....50&10@60%
Buffalo Adjustable.....℔ doz. $3.00, 25%
Buffalo Double Adjustable.. ℔ doz. $3.00, 25%

Knobs—

Door, Mineral.....60@65%
Door, Por. Jap'd.....70@75%
Door, Por. Nickel.....$2.00@$2.25
Door, Por. Plated Nicke..l....$2.00@$2.25
Drawer, Porcelain.....60&10@60&10&10%
Hemacite Door Knobs.....40&10@50%
Yale & Towne Wood, list Dec., 1885,..40%
Furniture Plain.....75¢ gro inch, 10%
Furniture, Wood Screws.....25&10%
Base, Rubber Tip.....70&10&5%
Picture, Judd's.....60&10&10@70%
Picture, Sargent's.....70&10%
Picture, Hemacite.....35&5%
Shutter, Porcelain.....65&1%
Carriage, Jap .....℔ gro 80¢, 60&10%
Bardsley's Wood Door, Shutter, &c...40%

Ladles—

Melting, Sargents'.....60@60&5%
Melting, Reading.....35&10%
Melting, Monroe's Pat...℔ doz $4.00, 40%
Melting, P., S. & W.....35&10@40%
Melting, Warner's.....30%

Lanterns—

Tubular—

Regular, with Guard.....℔ doz $3.50
O. K., with Guard.....℔ doz $3.75
Side Lift, with Guard.....℔ doz $4.00
Square Lift, with Guard.....℔ doz $4.25
Anti-Friction, with Guard...℔ doz $4.50
Brass Plated, Sq. Lift, Guard.℔ doz $5.50
Cop. Plated, Sq. Lift, Guard..℔ doz $5.50

Bull's Eye Police—

2¾-inch regular.....℔ doz $3.60
3-inch regular.....℔ doz $3.90
2¾-inch flash light.....℔ doz $4.00
3-inch flash light.....℔ doz $4.50

Lawn Mowers—

See *Mowers, Lawn.*

Leaders, Cattle—

Humason, Beckley & Co.'s.....70%
Sargent's.....70&10@70&10&10%
Hotchkiss.....30%
Peck, Stow & W. Co.....60&10%

Lemon Squeezers—

See *Squeezers, Lemon.*

Lifters, Transom—

Wollensak's:
Class 3 and 4, Bronzed Iron.....50%
Class 3 and 4, Bronze Metal.....25%
Class 3 and 4, Brass.....35%
Skylight Lifters.....35%
Crown, Eagle and Shield.....50%
Reiher's, list Feb. 20, 1891
Bronzed Iron Rods.....50&10&10&2%
Brass, Real Bronze or Nickel Plate..30%
Excelsior.....50&10&2%
Shaw's.....50&10%
Payson's:
Universal.....60%
Solid Grip.....60&10%
Imperial.....50&10%

Lines—

Cotton and Linen Fish, Draper's.....50%
Draper's and Tate's Chalk.....60%
Draper's Masons' Linen, 84 ft., No. 1, $1.25; No. 2, $1.75; No. 3, $2.25; No. 4, $2.75; No. 5, $3.25.....55%
Cotton Chalk.....25%
Samson Cotton, No. 4, $2; No. 4½, $2.50; 10%
Silver Lake, Braided, No. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ℔ gro.....25%
Mason's Linen, No. 3½, $1.50; No. 4, $2.00; No 4½, $2.50.....45%
Mason's Colored Cotton.....45%

Wire Clothes..Nos.	18	19	20
100 ft.....	$3.50	$3.00	$2.50

Ventilator Cord, Samson Braided, White or Drab Cotton..℔ doz $7.50..20%
Ossawan Mills, Chalk, Twisted, 60%; Chalk, Soft Braided, 50% Chalk, Braided, 25%.

Links, Open—

Terry's—per gro.:

Nos.....	1	2	3	4
	$6.00	8.00	12.00	16.00

Locks, &c.—

Cabinet—

Eagle, Gaylord Parker and Corbin... } List March, '84, rev. Jan. 1, '85.33⅓&2%
Deitz, Nos. 36 to 39.....40%
Deitz, Nos. 51 to 63.....40&10%
Deitz, Nos. 87 to 96.....30%
Stoddard Lock Co.....30@33⅓%
"Champion" Night Latches.....40%
Barnes Mfg. Co.....40@40&10%
Eagle and Corbin Trunk.....25&10%
"Champion" Cab. and Combin...33⅓%
Yale.....net prices
Romer's.....25%

Door, Locks, Latches, &c.—

R. & E. Mfg. Co., list Mar.20, 1889..... } 65&10@70% Much
Mallory, Wheeler & Co., list July, '88..... } lower net prices
Sargent & Co., List Aug.1, '88 } often
Branford Lock Works ..... } made.

Brittan, Graham & Mathes, list Jan. 1890.....60&10&10%
Perkins' Burglar Proof.....60&25%
Plate.....33⅓&2%
Barnes Mfg. Co.....40@40&10%
Yale.....net prices
Deitz Flat Key.....30%
L. & C. Round Key Latches.....30&10%
L. & C. Flat Key Latches.....33⅓&10%
Romer's Night Latches.....15%
Brooklyn Latches.....50&10%
Shepardson or U. S.....35%
Seed's N. Y. Hasp Lock.....25%

Padlocks—

List June 10, 1891.....50&[illegible]
Norwich Lock Mfg. Co., old list.....70&2%
Yale Lock Mfg. Co.'s.....net prices
Eagle.....40%
Eureka, Eagle Lock Co.....40&2%
Romer's Nos. 0 to 91.....30%
Romer's Scandinavian, &c., Nos. 100 to 505.....15%
A. E. Deitz.....40%
Champion Padlocks.....40%
Hotchkiss.....30%
Star.....60%
Horseshoe.....₩ doz $9, 40@40&10%
Barnes Mfg. Co.....40@40&10%
Nock's.....30%
Brown's Pat.....25%
Scandinavian.....90@40%
E. T. Fraim's Keystone Scandinavian, Nos. 119, 120, 130 and 140.....90&10%
Other Nos.....65
Ames Sword Co. up to No. 150.....40%
Ames Sword Co. above No. 150.....50%
Slaymaker, Barry & Co.
No. 1010 line.....85&5%
No. 41 line.....45&10%
No. 61 line.....50&5%
No. 21 line.....75%

Sash, &c.—

Clark's No. 1, $10; No. 2, $8 ₩ gr.....33⅓%
Ferguson's.....33⅓%
Victor.....60&10&2%
Walker's.....10%
Attwell Mfg. Co.....25&33⅓%
Reading.....66⅔&10@66⅔&10&10%
Hammond's Window Springs.....40%
Common Sense, Jap'd, Cop'd and Br'zed.....₩ gr $4.00
Common Sense, Nickel Plated. ₩ gr $10.00
Universal.....30%
Kempshall's Gravity.....60%
Kempshall's Model.....60@60&10%
Corbin's Daisy, list Feb. 15, 1886.....70%
Payson's Perfect.....60&10%
Hugunin's Sash Balances.....25&5&2%
Hugunin's New Sash Locks.....25&5&2%
Stoddard's "Practical".....10%
Ives' Patent.....60&10@60&10&5%
Fish (Liesche's pat.), No. 100, ₩ gr., $8; No. 105, ₩ gr., $10.....50%
Davis, Bronze, Barnes Mfg. Co.....70%
Champion Safety, list January, 1889.....04%
Security.....70%
Giant, list Jan., 1892.....70&5%
Wolcott's.....60&10&5%
Monarch.....50%

Lumber Tools—

See *Tools, Lumber.*

Lustre—

Four-ounce bottles.....₩ doz, $1.75; ₩ gross.....$17.00

Machines.

Boring—

	Without Augers.	Upright.	Angular.
Douglas	$5.50	$6.75	..... 50%
Snell's, Rice's Pat...	5.50	6.75	40&10&10%
Jennings'.....	5.50	6.75	45@45&10%
Other Machines..	2.35	2.75	.....
Phillips' Patent with Augur.....	7.00	7.50	.....
Miller's Falls.....	7.50	.....	..... 25%

Fluting—

Knox, 4¼-inch Rolls.....$3.25 each } 35%
Knox, 6-inch Rolls.....$3.60 each }
Eagle, 3½-inch Rolls, $2.15.....35%
Eagle, 5½-inch Rolls, $2.85.....35%
Crown, 4½ in., $3.50; 6 in., $4.00; 8 in., $6.50 each.....35%
Crown Jewel, 6 in.....$3.50 each, 35%
American, 5 in., $3.00; 6 in., $3.40; 7 in., $4.50 each.....35%
Domestic Fluter.....each, $1.50
Geneva Hand Fluter, White Metal, ₩ doz $12, 25%
Crown Hand Fluter, Nos. 1, $15.00; 2, $12.50; 3, $10.00.....30%
Shepard Hand Fluter, No. 85, per doz $15.30.....40%
Shepard Hand Fluter, No. 110, ₩ doz $11.00.....40%
Shepard Hand Fluter No. 95, ₩ doz $8.00.....40%
Clark's Hand Fluter, ₩ doz $15.00.....35%
Combined Fluter and Sad Iron. ₩ doz $15.00.....30%
Buffalo, ₩ doz $10.00.....10%

Hoisting—

Moore's Hand Hoist, with Lock Brake.20%
Moore's Differential Pulley Block.....40%
Energy's Mfg. Co.'s.....25%
Sure Grip Steel Tackle Blocks.....25%

Washing—

Anthony Wayne, ₩ doz, No. 1, $51; No. 2, $45; No. 3, $42.
Western Star, ₩ doz, No. 2, $45; No. 3 $48.
Weisell.....₩ doz $54.00
Fair and Square.....₩ doz $42.00

Mallets—

Hickory.....20&10@20&10&10%
Lignumvitæ.....20&10@20&10&10%
B. & L. Block Co., Hickory & L. V. 30@30&10%

Mattocks—Regular list. 60&10@60&10&5%

Measures—

tandard Fiberware, No. 1, peck ₩ dozen, $4; ½-peck, $3.50.

Meat Cutters—

See *Cutters, Meat.*

Menders, Harness—

Per doz.....$2.00

Mills—

Coffee—

Box and Side, List Jan. 1, 1888, 30@60&10% Net prices are often made which are lower than above discount.
American, Enterprise Mfg. Co. 20&10&30%
The Swift, Lane Bros.....30%

Mincing Knives—

See *Knives, Mincing.*

Molasses Gates—

See *Gates, Molasses.*

Money Drawers—

See *Drawers, Money.*

Mowers, Lawn—

Philadelphia.....60&10%
Pennsylvania and Continental.....60%
New Model and Excelsior.....60@60&10%
Other Machines.....60&10&10@75%

Muzzles—

Safety.....₩ doz. $3.00, 25%

Nails.—

Cut and Wire. See Trade Report.
Wire Nails, Papered.
Association list, May 1, '92.80&10&10&5%
Tack Mfrs.' list.....70&5@70&10%
Wire Nails, Standard Penny.
Card, Apr. 11, '92 base.....$1.80@$1.85
Hungarian Nails, Finishing, &c. See *Tacks.*

Horse—

	Nos. 6	7	8	9	10	
American	83¢	83¢	83¢	83¢	83¢	.net
Ausable	28¢	26¢	25¢	24¢	23¢	40&5&5&2%
Clinton, Fin.	19¢	17¢	16¢	15¢	14¢	.30&10%
Essex	28¢	26¢	25¢	24¢	23¢	40&10&5&250&5%
Lyra	19¢	17¢	16¢	15¢	14¢	.40&10%
Snowden	19¢	17¢	16¢	15¢	14¢	.40&10%
Vulcan	25¢	21¢	20¢	19¢	18¢	.25%
Northwest'n.	25¢	23¢	22¢	21¢	20¢	40&5&5&2%
Champlain	28¢	26¢	25¢	24¢	23¢	25@25&5%
A. C.	25¢	23¢	22¢	21¢	21¢	25&10@33⅓&5%
C. B. K.	25¢	23¢	22¢	21¢	21¢	33⅓@33⅓&10%
Maud S.	25¢	23¢	22¢	21¢	21¢	40&10&5%
Saranac	23¢	21¢	20¢	19¢	18¢	..40&5%
Champion	25¢	23¢	22¢	21¢	20¢	10&10&10%
Capewell	19¢	18¢	17¢	16¢	16¢	.10%
Anchor	23¢	21¢	20¢	19¢	18¢	.35%
Western	23¢	21¢	20¢	19¢	18¢	.50%
Empire Bronzed					13@14	₩ ℔

Picture—

Brass Head, Sargent's list.....60@60&10%
Brass Head, Combination list.....50&10%
Porcelain Head, Sargent's list.50&10&10%
Porcelain Head, Combination list.40&10%
Niles' Patent.....40%

Nail Pullers—See *Pullers, Nail.*

Nail Sets—See *Sets, Nail.*

Nut Crackers—

See *Crackers, Nut.*

Nuts—List Dec. 18, 1889.

	Square.	Hex.
Hot Pressed	5.40¢	6.00¢ off list
Cold Punched	5.00¢	5.10¢ off list

In packages of 100 ℔, add 1-10¢ ₩ ℔, net; in packages less than 100 ℔, add ½¢ ₩ ℔, net.

Oakum—

Best or Government.....₩ ℔ 6¾@7¼¢
U. S. Navy.....₩ ℔ 5¾@6¢
Navy.....₩ ℔ 5¢@5¼¢

Oilers—

Zinc and Tin.....65&10@70&5%
Brass and Copper.....50&10@50&10&5%
Malleable, Hammers' Improved, No. 1, $3.00; No. 2, $4.00; No. 3, $4.40 ₩ doz. 10@10&5%
Malleable, Hammers' Old Pattern, same list.....45%
Prior's Pat. or "Paragon" Zinc. 60&10&10%
Prior's Pat. or "Paragon" Brass.....50%
Olmstead's Tin and Zinc.....60%
Olmstead's Brass and Copper.....50%
Broughton's Zinc.....60%
Broughton's Brass.....50%
Gem, P., D. & Co.....₩ gro. $2
Steel, Draper & Williams.....50%

Openers, Can—

Messenger's Comet.....₩ doz $3.00, 25%
American.....₩ gross $2.75@$3.00
Duplex.....₩ doz 25¢, 15@20¢
Lyman's.....₩ doz $3.75, 20%
No. 4, French.....₩ doz $2.25, 55@60%
No. 5, Iron Handle.....₩ gr $6.00, 45@50%
Eureka.....₩ doz $2.50, 10%
Sardine Scissors.....₩ doz $2.75@3.00
Star.....₩ doz $2.75
Sprague, No. 1, $2.00; 2, $2.25; 3, $2.50; 66⅔@70%
Excelsior, No. 1 $2.50; No. 2, $1.50.....40%
World's Best, ₩ gross, No. 1, $12.00; No. 2, $24.00; No. 3, $36.00.....50&10%
Universal, ₩ doz $3.00.....55&5%
Domestic, ₩ doz $2.00.....45%
Champion, ₩ doz $2.00.....60%

Packing, Steam—

Rubber—

Standard.....70@70&10%
Extra.....60@60&5%
N. Y. B. & P. Co., Standard.....50%
N. Y. B. & P. Co., Empire.....60%
N. Y. B. & P. Co., Salamander.....25%
Jenkins' Standard, ₩ ℔ 80¢.....20@25&5%

Miscellaneous—

American Packing.....10¢@11¢ ₩ ℔
Russia Packing.....14¢ ₩ ℔
Italian Packing.....13¢@14¢ ₩ ℔
Cotton Packing.....15¢@17¢ ₩ ℔
Jute.....7¢@8¢ ₩ ℔

Pails—

Galvanized—

	Quarts 10	12	14
Hill's Light Weight, ₩ doz.	$2.75	3.00	3.25
Hill's Heavy Weight, ₩ dz.	3.00	3.25	3.75
Helwig's	2.50	2.75	3.00
Sidney Shepard & Co.	2.35	2.85	3.05
Iron Clad	2.50	2.75	3.00
Fire Buckets	2.75	3.25	3.50

Buckets—See Well Buckets.

Indurated Fiber Ware—25%

Star Pails, 12 qt.....₩ doz $5.40
Stable and Milk, 14 bt.....₩ doz $6.00
Fire Pails, deep.....₩ doz $5.40
Fire Pails, round bottom.....₩ doz $7.80

Standard Fiber Ware—

	Plain.	Decr'd
Water Pails, 12 qt., ₩ doz.	$4.00	$4.50
Dairy Pails, 14 qt., ₩ doz.	4.50	5.00
Fire Pails, No. 1, 12 qt., ₩ doz	4.50	
Fire Pails, No. 2, 14 qt., ₩ doz	5.00	
Sugar Pails	5.00	6.50
Horse Pails	5.00	
Buggy Pails	4.00	
Slop Jars (bal. trap)	8.00	9.00
Chamber Pails, 14 qt.	6.50	7.50

Pans—

Dripping—

Small sizes.....₩ ℔ 6¼¢
Large sizes.....₩ ℔ 5½¢
Silver & Co. (Covered).....40%

Fry—

Standard List:

No.	0	1	2	3	4	5	6	7	8
₩ doz.	$3.00	$3.75	$4.25	4.75	$5.25				
No.		5	6	7	8				
₩ doz.		$6.00	$7.00	$8.00	$9.00				

Polished, regular goods.....75@75&10%
Acme Fry Pans.....60%

Dust—

Steel Edge, No. 1.....₩ doz $1.75

Paper and Cloth—Sand and Emery—

List April 19, 1886..... 50&10@50&10&5%
Sibley's Emery and Crocus Cloth.....30%

Parers—

Apple—

Advance.....₩ doz $4.75
Baldwin.....₩ doz 5.25
Bonanza.....each 5.00
Daisy.....₩ doz 4.00
Dandy.....each 7.50
Eclipse.....₩ doz 4.25
Eureka, 1888.....each 16.00
Family Bay State.....₩ doz 12.00
Favorite.....₩ doz 5.00
Gold Medal.....₩ doz 4.00
Ideal.....₩ doz 4.00
Improved Bay State....₩ doz 27.00&30.00
Little Star.....₩ doz 4.50
Monarch.....₩ doz 13.50
New Lightning.....₩ doz 5.50
Oriole.....₩ doz 4.00
Penn.....₩ doz 4.00
Perfection.....₩ doz 4.00
Pomona.....₩ doz 4.00
Rocking Table.....₩ doz 6.00
Turn Table.....₩ doz 4.50
Victor.....₩ doz 13.50
Waverly.....₩ doz 4.00
White Mountain.....₩ doz 4.00
72.....₩ doz 4.25
78.....₩ doz 7.00

Potato—

White Mountain.....₩ doz $4.50
Antrim Combination.....₩ doz $5.50
Hoosier.....₩ doz $13.50
Saratoga.....₩ doz $5.50

Pencils—

Faber's Carpenters'.....high list 50%
Faber's Round Gilt.....₩ gro $5.25
Dixon's Lead.....₩ gro $4.50
Dixon's Lumber.....₩ gro $6.75
Dixon's Carpenters'.....10%

Picks—

Railroad or Adze Eye, 5 to 6, $12.00; 6 to 7, $13.00.....60&10&10@60&10&5%

Picture Nails—

See *Nails, Picture.*

Pinking Irons—

See *Irons, Pinking.*

Pins—

Bow—

Humason, Beckley & Co.'s.....60&10%
Sargent & Co.'s, $17 and $18.....60&10%
Peck, Stow & W. Co....50&10@50&10&5%

Curtain—

Silvered Glass.....net
White Enamel.....net

Escutcheon—

Iron, list Nov. 11, 1885..50&10@50&10&5%
Brass.....60@60&5%

Pipe, Wrought Iron—

List October 12, 1892.

1¼ and under, Plain	5&5@	5&10%
1¼ and under, Galv	45&5@	45&10%
1½ and over, Plain	65&5@	65&10%
1½ and over, Galv	55&5@	55&10%

Boiler Tubes, new list.....65%
Casing.....52½%
Inserted Joints Casing.....47½%
Steel Boiler Tubes.....27½%
Cold Drawn Seamless Steel Tubing..50%

Planes and Plane Irons—

Wood Planes—

Molding.....40&10@40&10&10&10%
Bench, First quality..50&10@ 50&10&10&10%
Bench, Second quality..55&10@ 55&10&10&10%
Bailey's (Stanley R. & L. Co.).....50&10%

Iron Planes—

Bailey's (Stanley R. & L. Co.).....50&10%
Miscellaneous Planes (Stanley R. & L. Co.).....25&10%
Steers' Iron Planes.....40&10%
Meriden Mal. Iron Co.'s.....40@40&10%
Davis' Iron Planes.....40@40&10%
Birmingham Plane Co.....50@50&10%
Gage Tool Co.'s Self-Setting...20&10&10%
Chaplin's Iron Planes.....40@40&10%
Sargent's.....60%
Standard Tool Co.....50&50&5%

Plane Irons—

Butcher's.....$5.00@$5.25 to $
Buck Bros.....30%
Auburn Thistle } .....30&10%
Ohio }
Sandusky }
L. & I. J. White.....25
Stanley R. & L. Co.....50&10%

Plates—

Felloe.....₩ ℔ 6¢@6¼¢

Pliers and Nippers—

Button's Patent.....60%
Hall's No. 2, 5 in., $13.50; No. 4, 7 in., $21.00 ₩ doz.....40%
Humason & Beckley Mfg. Co..50@50&10%
Lindsay's Giant.....33⅓%
Gas Pliers.....60%
Gas Pliers, Custar's Nickel Plated..60&5%
Eureka Pliers and Nippers.....40%
Russell's Parallel.....25%
P., S. & W. Cast Steel.....50%
P., S. & W. Tinners' Cutting Nippers, add 6¢.....10%
Carew's Pat. Wire Cutters.....20%
Morrill's Parallel, ₩ doz, $12.00.....30&5%
Cronk's 8 in., $15.00; 10 in., $21.00..... 50&50&5%
ronk's Button Pattern.....50&10@60%
ronk's Carrier Pliers.....60@60&5%

Plumbs and Levels—

Regular List.....75&10@75&10&5%
Stanley's Duplex.....20&10%
Stanley's Handy.....20&10%
Disston's.....50%
Pocket Levels.....70&10@70&10&10%
Davis Iron Levels.....30%
Davis' Inclinometers.....10&10%

Poachers, Egg—

Buffalo Steam Egg Poachers, ₩ doz, No. 1, $6.00; No. 2, $9.00.....25%
Silver & Co., 6-Ring, ₩ doz, $4.00; 3-Ring.....$2.00

Pokes, Animal—

Bishop's I. X. L.....₩ doz $6.00
Bishop's O. K.....₩ doz $5.25
Bishop's Pioneer.....₩ doz $3.75
Bishop's American.....₩ doz $2.75
Eagle, Double Stale.....₩ doz $5.75
Eagle, Single Stale.....₩ doz $3.75
Buckeye, Single Stale.....₩ doz $2.75
Bolding.....₩ doz $6.00

Police Goods—

R. I. Tool Co., Handcuffs, $15.00 ₩ doz 10%
R. I. Tool Co., Leg Irons, $25.00 ₩ doz 10%
Tower's.....25%
Daley's Improved Handcuffs: 2 Hands, Polished, ₩ doz, $48.00; Nickeled, $57.00; 3 hands, Polished, ₩ doz, $72.00; Nickeled, $84.00.....25%
J. P. Lovell's Police Goods.....25%

Polish—

Metal—

Prestoline.....30%
Prestoline Paste.....33⅓%
Gaston's Silver Compound.....33⅓%

Stove—

Joseph Dixon's.....₩ gro, $6.00, 10%
Gem.....₩ gro, $4.50, 10%
Gold Medal.....₩ gro, $6.00, 25%
Lustro.....₩ gro, $4.75
Ruby.....₩ gro, $3.75
Rising Sun, 5 gro lots.....₩ gro $5.50
Dixon's Plumbago.....₩ ℔ 8¢
Boynton's Noon Day.....₩ gro $13.00
Parlor Pride Stove Enamel, ₩ gro
Yates' Liquid, 2 3 5 10 gal
₩ gal. $0.80 .70 .60 .50
Yates Standard Paste Polish, 10 ℔ cans, ₩ ℔ 12½¢
Jet Black.....₩ gro $3.50
Japanese.....₩ gro $3.50
Fireside.....₩ gro $2.50
Diamond O. K. Enamel.....₩ gro $12.00
Bonnell's Liquid Stove Polish, ₩ gro $9.00
Bonnell's Paste Stove Polish, ₩ gro $6.00
Black Eagle Benzine Paste, 5 and 10 ℔ cans.....12½¢
Black Jack Water Paste, 5 and 10 ℔ cans.....12½¢
Nickel Plate Paste.....₩ gro $6.00
Crown Paste.....₩ gro $7.20
Crown Paste in 5 and 10 ℔ pails, ₩ ℔ 12¢
Black Flag.....₩ gro $7.20
Black Flag, 5 and 10 ℔ pails.....₩ ℔ 12¢
Black Flag, liquid, in bottles, ₩ gro $8.00
Diamond Rock Nickel Cleaner..... ₩ gro $10.20
Raven Paste:
5-lb. pails, (per case of 6 or 12), ₩ ℔ 12¢
Less than case.....₩ ℔ 15¢
Liquid, 6 oz. bottles.....₩ gross, $8.00
Liquid, 8 oz. bottles.....₩ gross, $9.00
Water Polish.....₩ gross, $5.85

Poppers, Corn—

Round or Square, 1 qt..₩ gr $10.00@10.50
Round or Square, 1½ qt..₩ gr $15@$15.50
Round or Square, 2 qt..₩ gr $18.50@19.00

Post Hole and Tree Augers and Diggers—

See *Diggers, Post Hole, &c.*

Potato Parers—

See *Parers, Potato.*

Pots—Glue—

Tinned.....40&10@40&10&5%
Enameled.....40&10@40&10&5%
Family, Howe's "Eureka".....40%
Family, L. F. C.'s "Handy".....50%

Powder—

In Canisters—

Fine Sporting, 1 ℔ each..... .....$0.90
Duck, 1 ℔ each..... .60
Rifle, 1 ℔ each..... .30
Rifle, ½ ℔ each..... .18
Rifle, ¼ ℔ each..... .13

In Kegs—

Rifle, 25 ℔ kegs.....$4.00
Rifle, 12½ ℔ kegs..... 2.25
Rifle, 6¼ ℔ kegs..... 1.25
Duck, 25 ℔ kegs..... 5.00
Duck, 12½ ℔ kegs..... 2.75
Duck, 6¼ ℔ kegs..... 1.50

Presses—

Fruit and Jelly—

Enterprise Mfg. Co. ..... 20&10@30%
Henis ..... ₱ doz $3.50
Shepard's Queen City 40%
Silver & Co. ..... ₱ doz $2.75

Pruning Hooks and Shears—See *Shears.*

Pullers, Nail—

Scranton ..... ₱ doz., $18.00, 33⅓%
Curtis Hammer ..... ₱ doz., $9.00
Giant, No. 1 ..... ₱ doz., $18.00, 10%
Giant, No. 2 ..... ₱ doz., $15.00, 10%
Pelican ..... ₱ doz., $9.00, 25%
Eclipse ..... Each, $2.00, net
Economy ..... ₱ doz., $6.00

Pulleys—

Hot House. Awning, &c. ..... 60%@70%
Japanned Screw ..... 60&10&10%
Brass Screw 70%
Japanned Side ..... 60&10&10%
Japanned Clothes Line ..... 60&10%
Empire Sash Pulley ..... 55@60%
Moore's Sash, Anti-Friction 50%
Hay Fork, Solid Eye, $4.00; Swivel, $4.50 ..... 50&10&50&10&5%
Hay Fork, "Anti-Friction," 5 in. solid, $5.70 ..... 50%
Hay Fork, "F" Common and Patent Bushed 20%
Hay Fork, Tarbox Pat. Iron 30%
Hay Fork, Reed's Self-Lubricating 60%
Shade Rack 45%
Tackle Blocks—See Blocks.
Moore's Anti-Friction 5 in. Wheel, ₱ doz., $12.00 ..... 40%

Pumps—

Cistern, Best Makers ..... 60@60&10%
Pitcher Spout, Best Makers ..... 67½@70%
Pitcher Spout, Cheaper G'ds. .75@75&10%

Punches—

Saddler's or Drive, good. ₱ doz., 60@65%
Bemis & Call Co.'s Cast Steel Drive. 50&5%
Bemis & Call Co.'s Springfield Socket ..... 50&5%
Spring, good quality. ₱ doz., $2.50@$2.60
Spring, Leach's Pat 15%
Bemis & Call Co.'s Spring and Check. 40%
Solid Tinners', P., S. & W. Co., ₱ doz., $1.44 ..... 55%
Tinners' Hollow Punches, P., S. & W. Co. ..... 20&2%
Rice Hand Punches 15%
Avery's Revolving 40%
Avery's Sawset and Punch—See Sawsets.

Rail—

Sliding Door, Wr't Brass. ₱ ℔, 35¢, 40%
Sliding Door, Bronzed Wr't Iron. ₱ ft., 7¢
Sliding Door, Iron, Painted. ₱ ft., 4¢, 40%
Barn Door, Light. In. ½ ⅝ ¾
Per 100 feet $2.00 2.50 3.10, 10%
B. D. for N. E. Hangers—
Small. Med. Large.
Per 100 feet ..... $3.15 2.70 3.25 Net
Terry's Steel Rail ..... ₱ ft., 4½¢
Victor Track Rail, 7¢ ₱ foot ..... 50&2%
Carrier, double braced, Steel Rail, ₱ foot ..... 4@4½¢
Moore's Wrought Iron 25%
Moody Steel Rail, ₱ ft., 5¢ 45%

Rakes—

Cast Steel, Association g'ds. .70@70&2%
Cast Steel, outside g'ds. ..... 70@70&5&2%
Malleable ..... 70@70&5%
Gibbs' Lawn Rake ..... ₱ doz., $4.90
Gibbs' Canton Lawn Rake. ₱ doz., $3.75
Gibbs' Acme Lawn Rake ..... ₱ doz., $4.75
Gibbs' Favorite Lawn Rake. ₱ doz., $3.90
Gibbs' Crown Lawn Rake, No. 1 ..... ₱ doz., $4.90
Gibbs' Crown Lawn Rake, No. 2 ..... ₱ doz., $5.40
Oneida Lawn Rake ..... ₱ doz., $6.00
Fort Madison Prize Bow Brace and Peerless 65%
Fort Madison Steel Tooth Lawn Rake, $6.00 ..... 25%

Razors—

J. R. Torrey Razor Co 20%
Wostenholm and Butcher, $10 to £.... 10%
Jordan's AAA1, new list ..... Net
Jordan's Old Faithful, new list ..... Net
Galvanic ..... ₱ doz., $15.00
Electric Cutlery Co. ..... Net
Campbell Cutlery Co. 50%

Razor Strops—See *Strops, Razor.*

Rings and Ringers—

Bull Rings—

Union Nut Co. 55%
Sargent's ..... 75&10%
Hotchkiss' low list 30%
Humason, Beckley & Co.'s ..... 70&10%
Peck, Stow & W. Co.'s. 50&10@50&10&10%
Ellrich Hdw. Co., White Metal, low list. 50@50&10%

Hog—

Top of the Hill Ringers ..... ₱ doz $2.00
Top of the Hill Rings ..... ₱ doz $1.25
Hill's Improved Ringers ..... ₱ doz $1.25
Hill's Old Style Ringers ..... ₱ doz $1.12½
Hill's Tongs ..... ₱ doz $3.00
Hill's Rings ..... ₱ doz bxs $1.00
Perfect Rings ..... ₱ doz bxs $1.50
Perfect Ringers ..... ₱ doz $2.15@$2.25
Blair's Hog Ringers ..... ₱ doz $2.00
Blair's Hog Rings ..... ₱ doz 90¢@$1.00
Champion Ringers ..... ₱ doz $2.00
Champion Rings, Double ..... ₱ doz $2.25
Brown's Ringers ..... ₱ doz $2.00
Brown's Rings ..... ₱ doz $1.15@$1.25
Electric Hog Rings ..... ₱ dos boxes $1.50
Electric Hog Ringers ..... ₱ doz $2.00
Major Rings ..... ₱ doz $1.25
Major Ringers ..... ₱ doz $2.00

Rivets and Burrs—

Iron, list Nov. 17, '87. ..60&10@60&10&5%
Copper ..... 60&10%
Coppered Iron, Bettina Brand 40%

Rivet Sets—See *Sets.*

Rods—

Stair, Brass ..... 25@30%
Stair, Black Walnut ..... ₱ doz 40¢

Rollers—

Barn Door, Sargent's list. ..... 60&10&10%
Acme Moore's Anti-Friction 50%
Union Barn Door Roller 70%
Thompson Mfg. Co.'s Lawn Rollers. 30%

Rope—The following prices are f.o.b. New York or factory, and are shaded ¼¢@½¢ on large lots; terms, 1½ % for cash.

Manila, 7-16 in. diam. and larger ₱ ℔ 10½¢
Manila ..... ⅜ in. ₱ ℔ 11 ¢
Manila ..... ¼ and 5-16 in. ₱ ℔ 11½¢
Manila, Tarred Rope ..... ₱ ℔ 10 ¢
Manila, Hay Rope ..... ₱ ℔ 10½¢
Sisal ..... 7-16 inch and larger ₱ ℔ 8 ¢
Sisal ..... ⅜ in. ₱ ℔ 8½¢
Sisal ..... ¼ and 5-16 in. ₱ ℔ 9 ¢
Sisal, Hay Rope. ¼ ₱ ℔ 8 ¢
Sisal, Tarred Rope ..... ₱ ℔ 7½¢
Sisal, Medium Lath Yarn ..... ₱ ℔ 7½¢
New Zealand. 7-16 in. & larger ₱ ℔ 6½¢
New Zealand ..... ⅜ inch, ₱ ℔ 7 ¢
New Zealand. ¼ and 5-16 inch, ₱ ℔ 7½¢
New Zealand, Hay Rope ..... ₱ ℔ 6½¢
New Zealand, Tarred Rope. ₱ ℔ 6 ¢
Cotton Rope ..... ₱ ℔ 13½@16¢
Jute Rope ..... ₱ ℔ 6½@7¢

Wire—

List February, 1892. All kinds 45%

Rules—

Boxwood ..... 80&10&10%
Ivory ..... 50&10%
Starrett's Rules and Straight Edges, Steel ..... 25&10%

Sad Irons—See *Irons, Sad.*

Sand and Emery Paper and Cloth—See *Paper and Cloth.*

Sash Cord—See *Cord, Sash.*

Sash Locks—See *Locks, Sash.*

Sash Weights—See *Weights, Sash.*

Sausage Stuffers or Fillers—See *Stuffers or Fillers, Sausage.*

Saws—The following prices are generally cut by jobbers.

Disston's Circular ..... 45@45&5%
Disston's Cross Cut ..... 45@45&5%
Disston's Hand 25%
Woodrough & McParlin.
Hand, Panel and Rip. ..... 30@30&5%
Narrow Champion Cross Cuts with Handles, ₱ foot ..... 18@20¢
Champion Thin Back Cross Cuts, ₱ foot ..... 26@28¢
Champion Extra Thin Back Cross Cuts, ₱ foot ..... 29@31¢
One Man Champion Cross Cuts, ₱ foot ..... 37@40¢
Wheeler, Madden & Clemson Mfg. Co. Hand, Panel and Rip. ..... 35@35&5%
Narrow Champion Cross Cuts with Handles, ₱ foot ..... 18@20¢
Champion Thin Back Cross Cuts, ₱ foot ..... 26@28¢
Champion Extra Thin Back Cross Cuts, ₱ foot ..... 29@31¢
One Man Champion Cross Cuts, ₱ ft. 37@39¢
Atkins' Circular Shingle & Heading. .50%
Atkins' Silver Steel Diamond X Cuts ₱ foot 70¢
Atkins' Special Steel Dexter X Cuts ₱ foot 50¢
Atkins' Special Steel Diamond X Cuts ₱ foot 32¢
Atkins' Champion and Electric Tooth X cuts ..... ₱ foot 30¢
Atkins' Hollow Back X Cuts... ₱ foot 20¢
Atkins' Mulay, Mill and Drag 40%
Atkins' One-Man Saw, with handles, ₱ foot 40¢
Peace Circular and Mill ..... 45@45&5%
Peace Hand Panel and Rip ..... 25@25&5%
Peace Cross Cuts ..... 45@45&5%
Richardson's Circular and Mill. 45@45&5%
Richardson's X Cuts ..... 45@45&5%
Richardson's Hand, &c. ..... 25@25&5%
C. E. Jennings & Co. Hand, Panel and Rip ..... 33⅓@33⅓&10%

Hack Saws—

Griffin's, complete ..... 40&10@50
Griffin's Hack Saw Blades ..... 40&10@50
Star Hack Saws and Blades 25%
Eureka and Crescent 25%

Scroll—

Lester, complete, $10.00 ..... 25%
Rogers, complete, $4.00 ..... 25%
Barnes' Builders' and Cab Makers' $15, 25%
Barnes' Scroll Saw Blades 35%

Saw Frames—See *Frames, Saw.*

Saw Sets—See *Sets, Saw.*

Saw Tools—See *Tools, Saw.*

Scales—

Hatch, Counter, No. 171, good quality, ₱ doz $18.00@$19.00
Hatch, Tea, No. 161. ₱ doz $6.50@$7.00
Union Platform, Plain ..... $2.10@2.20
Union Platform, Striped ..... $2.40@2.50
Chatillon's Grocers' Trip Scales 50%
Chatillon's Eureka 25%
Chatillon's Favorite 40%
Family, Turnbulls ..... 30@30&10
Riehle Bros.' Platform 40%

Scale Beams—See *Beams, Scale.*

Scissors, Fluting 45%

Scrapers—

Adjustable Box Scraper (S. R. & L. Co.) $6.00 ..... 30&10%
Box, 1 Handle ..... ₱ doz $2.25@$2.50
Box, 2 Handle ..... ₱ doz $3.00@$3.25
Defiance Box and Ship ..... 20&10%
Foot ..... 50&10&60%
Ship, Common ..... ₱ doz $3.50 net
Ship, R. I. Tool Co. 10%

Screen Window and Door Frames—See *Frames.*

Screw Drivers—See *Drivers, Screw.*

Screws—

Bench and Hand—

Bench, Iron ..... 55&10@55&10&10%
Bench, Wood, Beech ..... ₱ doz $2.25
Bench, Wood, Hickory ..... 20&10%
Hand, Wood ..... 25&10@25&10&5%
Hand, Grand Rapids, list 35%
Lag, Blunt Point, list Jan. 1, 1890. 75&10%
Coach and Lag, Gimlet Point, list Jan. 1, 1890 ..... 75@75&10%
Bed ..... 25&5%
Hand Rail, Sargent's ..... 70&10%
Hand Rail, H. & F. Mfg. Co. ..... 70&10@75%
Hand Rail, Am. Screw Co. 75%
Jack Screws, Millers Falls list. 50@50&10%
Jack Screws, P., S. & W. 35%
Jack Screws, Sargent 70%
Jack Screws, Stearns' ..... 40@40&10%

Cork—

Humason & Beckley Mfg. Co. .40&10@50%
Williamson's ..... 33⅓@33⅓&5%
Howe Bros. & Hulbert 35%

Machine—

Flat Head Iron 65%
Round Head Iron 60%

Wood—

List January 1, 1891.

Flat Head Iron	70%	Extra 10 or 10 & 5 % often given.
Round Head Iron	65%	
Flat Head Brass	70%	
Round Head Brass	65%	
Flat Head Bronze	70%	
Round Head, Bronze	65%	

Rogers' Drive Screws 82½%

Scroll Saws—See *Saws, Scroll.*

Scythes—

Grain ..... 40&5@40&10%
Grass ..... 40@40&10&50%

Scythe Snaths—See *Snaths, Scythe.*

Sets—

Awl and Tool—

Aiken's Sets, Awls and Tools, No. 20, ₱ doz $10.00 ..... 60@60&5%
Fray's Adj. Tool Hdls., Nos. 1, $12; 2, $18; 3, $12; 4, $9 ..... 45%
Millers Falls Adj. Tool Hdls., Nos. 1, $12; 2, $18 ..... 25%
Henry's Combination Haft. ₱ doz $6.50
Stanley's Excelsior: No. 1, $7.50; No. 2, $4.00; No. 3, $5.50 ..... 30&10%
Common Brad Sets, No. 42, $10.50; No. 43, $12.50. .70&10&5%

Nail—

Square ..... ₱ gr. $4.00@$4.25
Round ..... ₱ gr. $3.25
Buck Bros. 27½%
Cannon's Diamond Point. ₱ gr. $12, 20%

Rivet—

Regular list 70%

Saw—

Stillman's Genuine. ₱ doz $5.00@7.75, 40&5%
Stillman's Pattern, Hand, ₱ doz $3.25; Cross Cut, $5.25 ..... 55%
Common Lever ..... ₱ doz $2.00, 45@50%
Morrill's No. 1, $15.00 ..... 40&20%
No. 11, $15.00 ..... 40&10@40&10&5%
Nos. 3 and 4, $18.00 ..... 40&5%
No. 5, $24.00 ..... 40&5%
Leach's. No. 0, $8.00; No. 1, $15. .15@20%
Nash's ..... 20&10@20&10&10
Hammer, Hotchkiss $5.50, 10%
Hammer, Bemis & Call Co.'s new Pat., 30&5%
Bemis & Call Co.'s Lever and Spring Hammer ..... 30&5%
Bemis & Call Co.'s Plate 10%
Bemis & Call Co.'s Cross Cut 12½%
Aiken's Genuine ..... $13.00, 50&10&60%
Aiken's Imitation ..... $7.00, 55&5%
Hart's Pat. Lever 30%
Disston's Star 25%
Leopold ..... 40&10@50%
Atkin's Lever ..... ₱ doz No. 1, $6.00
Atkin's Criterion ..... ₱ doz No. 1, $6.00
Croissant (Keller), No. 1, $15.00; No. 2, $24.00 ..... 40&10%
Avery's Saw Set and Punch 50%
Kohler's Royal ..... ₱ doz $7.00
Kohler's Giant Royal ..... ₱ doz $12.00
Crescent ..... ₱ doz $3.00
Lloyd's Acme ..... ₱ doz $15, 40&10%
Taintor Positive ..... ₱ doz $18, 50%

Sharpeners, Knife—

Larkins'.
Applewood Handles. ₱ doz. $6.00, 40%
Rosewood or Cocobola. ₱ doz. $9.00 40%

Shaves, Spoke—

Iron 45%
Wood 30%
Bailey's (Stanley R. & L. Co.) ..... 40&10%
Stearns' ..... 50&10%
Cincinnati ..... 25&10%
Goodell's ₱ doz. $9.00 ..... 25%

Shears—

American (Cast) Iron. .75&10@75&10&5%
Barnard's Lamp Trimmers. ₱ doz. $3.75
Tinners' ..... 20&2%
Seymour's, List Dec. 1881. 60&10&10@60&10&10&5%
Heinisch's, List Dec. 1881. 60&10&10@60&10&10&5
Heinisch's Tailor's Shears 33⅓%
Cast Steel Trimmers:
First quality ..... 80@80&10%
Second quality ..... 80&10@80&10&10%
Acme Cast Shears ..... 10&10%
Diamond Cast Shears 10%
Clipper ..... 10&10%
Victor Cast Shears ..... 75&10@75&10&5%
Howe Bros. & Hulbert, Solid Forged Steel 40%
Chicago Drop Forge & F. Co, Solid Steel Forged 60%
Davenport Cutlery Co. ..... 60@60&10%
Clauss Shear Co., Japanned 70%
Clauss Shear Co., Nickeled, same list. 60%
Galvanic 3½ to 9 in., ₱ doz. $1.00 ₱ inch
Electric Cutlery Co ..... Net
Campbell Cutlery Co., Jap'd 75%
Nickel Plated 65%

Pruning Shears and Hooks.

Disston's Combined Pruning Hook and Saw ..... ₱ doz. $18.00, 20&10%
Disston's Pruning Hook, ₱ doz. $12.00 20&10%
E. S. Lee & Co.'s Pruning Tools 40%
Pruning Shears, Henry's Pat., ₱ doz. $3.75@$4.00
Henry's Pruning Shears, ₱ doz. $4.25 @$4.50
Wheeler, M. & C. Co., Combination, ₱ doz $12.00, 20%
Dunlap's Saw and Chisel, ₱ doz $8.50, 30%
J. Mallinson & Co., No. 1, $5.25; No. 2, $7.25
P., S. & W. Co. 60%

Tinners', &c.—

Shears and Snips (P. S. & W.) ..... 20@25%
Snips, J. Mallinson & Co 33⅓%

Sheaves—

Sliding Door—

M. W. Co., list July, 1888. ..50&10@60&5%
R. & E., list Dec. 18, 1885 ..... 55&20%
Corbin's list ..... 60&10&2%
Patent Roller ..... 60&10&2%
Patent Roller, Hatfield's 75%
Russell's Anti-Friction, list Dec. 18, 1885 ..... 60&2%
Moore's Anti-Friction 50%

Sliding Shutter—

R. & E., list Dec. 18, 1885 ..... 60&10&2%
Sargent's list 70%
Reading list ..... 60&10&10%

Shells—

First quality 4, 8, 10 and 12 gauge 25&10&2%
First quality Rival, Club and Climax brands, 14, 16 and 20 gauge ($7.50 list) ..... 20&10&2%
Prize ..... 40&2%
Star, Club, Rival and Climax Brands. 33⅓&10&2%
Smokeless brand, 12, 10, 16 gauge. 33⅓&10&2%
Trap brand, 12 and 10 gauge. 33⅓&10&2%
Seibold's Comb. Shot Shells ..... 15&2%
Brass Shot Shells, 1st quality ..... 60&2%
Brass Shot Shells, Club, Rival, Climax. 65&2%

Shells Loaded—

Standard List, July 19, 1890 ..... 40&10&10@40&10&10&5%

Ship Tools—

L. & I. J. White ..... 20&5%

Shoes, Horse, Mule, &c.—

Horse—

Burden's, Perkins', Phœnix, Diamond State & Bryden's Boss, at factory. $4.00
Bryden's Frog Pressure, at factory. $5.00

Mule—

Add $1 ₱ keg to above prices.

Ox Wrought—

Ton lots ..... ₱ ℔ 9¢
1000 ℔ lots ..... ₱ ℔ 9½¢
500 ℔ lots ..... ₱ ℔ 10¢

Shot—

	Ton lots	Small lots
Drop, up to B, 25-℔ bag	$1.40	$1.45
Drop, up to B, 5-℔ bag	.35	.35
Drop, B and larger, 25-℔ bag	1.65	1.70
Drop, B and larger, 5-℔ bag	.40	.40
Buck and Chilled, 25-℔ bag	1.65	1.70
Buck and Chilled, 5-℔ bag	.40	.40
Dust Shot, 25-℔ bag	2.00	2.00
Dust Shot, 5-℔ bag	.45	.45

Shovels and Spades—

Ames' Shovels, Spades, &c., list Nov. 1, 1885 ..... 20%
NOTE.—Jobbers frequently give 5@7½% extra on above.
Griffith's Black Iron ..... 50&10%
Griffith's C. S. ..... 60@60&10%
Griffith's Solid C. S. R. R. Goods 20%
St. Louis Shovel Co. ..... 20@20&7½%
Hussey, Binns & Co. ..... 15@25%
Hubbard & Co. ..... 20@20&7½%
Lehigh Mfg. Co. ..... 50&10%
H. M. Myers Co. 30%
Payne Pettebone & Son ..... 33⅓&5%
Remington's (Lowman's Pat.) 30&10@40%
Rowland's Black Iron ..... 50&10%
Rowland's Steel ..... 60&5@60&10%
Terra Haute Shovel & Tool Co. 25%

Shovels and Tongs—

Iron Head ..... 60&10@60&10&5%
Brass Head ..... 60&10&10%

Sieves—

Mann's Tin Rim ..... 50&25%
Buffalo Metallic, S. S. & Co. ..... 50&25%
Shaker (Barler's Pat.) Flour Sifters ₱ doz $2.00; ₱ gr $21.00
Electric ..... ₱ gr $21.00
A. & W. Sifters ..... ₱ doz $2.00
Hunter's ..... ₱ doz $2.00

Sieves, Wooden Rim—

	Iron.	Plated.
Mesh 1 Nested, ₱ doz.	$0.80	$1.00
Mesh 20, Nested, ₱ doz.	.95	1.10
Mesh 24, Nested, ₱ doz.	1.15	1.25

Sinks, Wrought Steel—

Columbus, Painted or Unpainted ..... 30@30&10 %
Columbus, Galvanized and Enameled ..... 60@50&10 %
New Era, Painted ..... 40&10@50&5 %
New Era, Galvanized and Enameled ..... 60&10&10@70&5 %

Skeins, Thimble—

Western list ..... 75&5@75&10%
Columbus Wrt. Steel. Special net prices
Coldbrookdale Iron Co. 60%
Seneca Falls Pattern 60%
Utica P. S. T. Skeins 60%
Utica Turned and Fitted 35%

Slates—

School, by case ..... 50&10@50&10&10%

Snaps Harness &c.—

Anchor (T. & S. Mfg. Co.) 65%
Fitch's (Bristol) ..... 50&10%
Hotchkiss 10%
Andrews 50%
Sargent's Patent Guarded ..... 70&10&10%
German, new list ..... 40&10%
Covert ..... 50&10&5&2%
Covert, New Patent ..... 50&10&5&2%
Covert, New R. E. ..... 60&10&5&2%
Covered Spring ..... 60&10&10%
Covert's Saddlery Works' Triumph 33⅓%

Snaths, Scythe—

List ..... 50@50&5%

Soldering Irons—

See *Irons, Soldering.*

Spittoons, Cuspidors, &c.

Standard Fiberware—

Cuspidors, 8¼-inch, ₱ doz., No. 5, $8; No. 5X, $9.
Spittoons, Daisy, 8-inch, No. 1, $4; 10 and 11 inch, $6.

Spoke Shaves—

See *Shaves, Spoke.*

Spoke Trimmers—

See *Trimmers, Spoke.*

Spoons and Forks—

Tinned Iron—

Basting, Cen. Stamp. Co.'s list ..... 70&10%
Solid Table and Tea, Cen. Stamp. Co.'s list ..... 70&10%
Buffalo, S. S. & Co ..... 33⅓&2%

Silver Plated—

4 months or 5% cash 30 days:
Meriden Brit. Co., Rogers ..... 40&15%
C. Rogers & Bros ..... 40&15%
Rogers & Bros ..... 40&15%
Reed & Barton ..... 40@40&5%
Wm. Rogers Mfg. Co ..... 40, 15&5%
Simpson, Hall, Miller & Co ..... 40, 15&5%
Holmes & Edwards Silver Co ..... 40, 15&5%
L. Boardman & Son ..... 50&12½%

Miscellaneous—

Holmes & Edwards Silver Co.:
No. 67 Mexican Silver ..... 50&10&5%
No. 30 Silver Metal ..... 50&10&5%
No. 24 German Silver ..... 50&10&5%
No. 50 Nickel Silver ..... 50&5%
No. 49 Nickel Silver ..... 50&10&5%

Wm. Rogers Mfg. Co.:
Rogers' Silver Metal ..... 50&10&5%
18% Rogers' German Silver ..... 60&5%
22% Rogers' Nickel Silver ..... 50&5%
German Silver ..... 50@50&5%
German Silver, Hall & Elton ..... 50&5% cash
Nickel Silver ..... 50&5@50&10&5% cash
Brittannia ..... 60@60&5%
Boardman's Nickel Silver, list July 1, 1891 ..... 60&7½&5%
Boardman's Brittannia Spoons, case lots ..... 60&5% cash

Springs—

Door—

Torrey's Rod, 39 in. ..... ₱ doz $1.20@1.25
Gray's, ₱ gr. $20.00 ..... 25%
Bee Rod, ₱ gr., $20.00 ..... 20@25%
Warner's No. 1, ₱ doz $1.50; No. 2, $3.40 ..... 55@55&10%
Gem (Coil), list April 19, 1886 ..... 10@15%
Star (Coil), list April 19, 1886 ..... 20@20&5%
Victor (Coil) ..... 60&10@60&10&5%
Champion (Coil) ..... 60&10@60&10&10%
Cowell's, No. 1, ₱ doz $18.00; No. 2, $15.00 ..... 50@50&10%
Rubber, complete, ₱ doz $4.50 ..... 55&10%
Hercules ..... 50@50&10%

Carriage, Wagon, &c.—

Elliptic, Concord, Platform and Half Scroll ..... 60&10&10%
Cliff's Bolster Springs 25%

Squares—

Steel and Iron ..... } 85@85&5%
Nickel-Plated ..... }
Try Square and T Bevels ..... 60&10&10%
Disston's Try Square and T Bevels 50%
Winterbotton's Try and Miter ..... 30&10%
Starrett's Micrometer Caliper Squares, 25%
Avery's Flush Bevel Squares 40%
Avery's Bevel Protractor 50%

Squeezers—

Fodder—

Blair's ..... ₱ doz $2.00
Blair's "Climax" ..... ₱ doz $1.25

Lemon—

Porcelain Lined, No. 1 ..... ₱ doz $6.00 ..... 25&30%
Wood, No. 2 ..... ₱ doz $3.00, 35%
Wood, Common ..... ₱ doz $1.70@1.75
Dunlap's Improved ..... ₱ doz $3.75, 20%
Sammis ..... No. 1, $5.00; No. 2, $9; 12, $18 ₱ doz ..... 25&10%
Jennings' Star ..... ₱ doz $2.50
The Boss ..... ₱ doz $2.50
Dean's .. Nos. 1, ₱ doz $6.50; 2, $3.35; 3, $1.90; Queen, $2.50
Little Giant ..... 50@50&5%
King ..... 40&5%
Hotchkiss Straight Flash ..... ₱ doz $12.00
Silver & Co., Glass ..... ₱ gro. $9.00
Manny Lemon Juice Extractor:
Standard ..... ₱ doz $0.75@$1.00
Improved ..... ₱ doz $2.00

Standard Fiber Ware—

See *Ware, Standard Fiber.*

Staples—

Blind—

Barbed, ¼ in. and larger ..... ₱ ℔ 7@7½¢
Barbed, ¾ in. ..... ₱ ℔ 8@8½¢
Fence Staples, Galvanized } Same price as Brb Wire
Fence Staples Plain ..... } See Trd. Rep

Steelyards ..... 40&10@50%

Stocks and Dies—

Blacksmith's:
Waterford Goods 35%
Butterfield's Goods 35%
Lightning Screw Plate ..... 25@30%
Reece's New Screw Plates ..... 25@30%
Reversible Ratchet 30%
Gardner 25%
Green River ..... 25@30%

Stops, Bench—

Morrill's ..... ₱ doz $9, 50%
Hotchkiss's ..... ₱ doz $5, 10@10&10%
Weston's, No. 1, $10; No. 2, $9, 25&10&5%
McGill's, ₱ doz $3 ..... 10%
Cincinnati ..... 25&10%
Terrell's Nos. 1 and 2, ₱ doz., $3; No. 3, $3.60 ..... 30%

Stone—

Sythe Stones—

Pike Mfg. Co., list April, 1892 ..... 33⅓%
Cleveland Stone Co., list Nov. 1892 .. 33⅓%

Oil Stones, &c.—

Pike Mfg. Co:
Hindostan No. 1, ₱ ℔ ... 8¢
Sand Stone ..... 5¢
Turkey Oil Stone, 4 to 8 in ..... 80¢ } 40@40& 10%
Turkey Slips $2.00
Washita Stone, Extra ..... 50¢
Washita Stone, No. 1 ..... 40¢
Washita Stone, No. 2 ..... 30¢
Washita Slips, Extra ..... 80¢
Washita Slips, No. 1 ..... 70¢
Arkansas Stone, No. 1, 3 to 5½ in., $2.80 } 33⅓@33⅓&10%
Arkansas Stone, No. 1 5½ to 8 in., $3.50
Lake Superior ..... ₱ ℔ 13¢
Lake Superior Slips ..... ₱ ℔ 20¢

Stove Polish—

See *Polish, Stove.*

Stretchers Carpet—

Cast Steel, Polished ..... ₱ doz $2.2
Cast Iron, Steel Points ..... ₱ doz 75c@80¢
Socket ..... ₱ doz $1.75
Bullard's ..... 25@25&10%

Strops, Razor—

Genuine Emerson ..... 60@60&5%
Imitation " ..... 15¢ doz $2.00, 20&10&5%
Torrey's 20%
Badger's Belt and Com ..... ₱ doz $2.00
Lamont Combination ..... ₱ doz $4.00
Jordan's Pat. Padded, list Nov. 1, '89, 50%
Electric Cutlery Co ..... Net
Campbell Cutlery Co ..... Net

Stuffer or Fillers, Sausage—

Miles' Challenge, ₱ doz $20 ..... 50@50&5%
Perry ..... ₱ doz, No. 1, $15.00; No. 0, $21.00 ..... 50&5@50&10%
Draw Cut No. 4, each $30.00 ..... 20%
Enterprise Mfg. Co ..... 20&10@30%
Silver's ..... 40&10%

Sweepers, Carpet and Lawn—

Carpet—

Bissell No. 5 ..... ₱ doz $17.00
Bissell No. 8 ..... ₱ doz $20.00
Bissell, Grand ..... ₱ doz $36.00
Standard ..... ₱ doz $24.00
Domestic ..... ₱ doz $21.00
Domestic, No. 2 ..... ₱ doz $22.00
Grand Rapids ..... ₱ doz $24.00
Crown Jewel, No. 1, $18.00; No. 2, $19.00; No. 3, $20.00
Magic ..... ₱ doz $15.00
Improved Parlor Queen, Nickeled ..... ₱ doz $27.00
Japanned ..... ₱ doz $24.00
Excelsior ..... ₱ doz $22.00
Garland ..... ₱ doz $18.00
Parlor Queen ..... ₱ doz $24.00
Housewife's Delight ..... ₱ doz $15.00
Queen ..... ₱ doz $16.00
Queen, with band ..... ₱ doz $18.00
King ..... ₱ doz $30.00
Weed, Improved ..... ₱ doz $18.00
Hub ..... ₱ doz $16.00
Cog-Wheel ..... ₱ doz $16.00
Ladies' Friend ..... ₱ doz $15.00
Ladies' Friend No. 2 ..... ₱ doz $16.00
Advance ..... ₱ doz $18.00
Our Leader ..... ₱ doz $19.00
Triumph ..... ₱ doz $20.00
Goshen ..... ₱ doz $21.00
Supreme ..... ₱ doz $22.00
Easy ..... ₱ doz $22.00
Gilt Edge ..... ₱ doz $24.00
Acme ..... ₱ doz $26 00
Imperial ..... ₱ doz $26 00
Grand Republic ..... ₱ doz $30 00
Banner ..... ₱ doz $22.00
The Star ..... ₱ doz $21.00
Reliable ..... ₱ doz $22.00
The Rapid ..... ₱ doz $22.00
Our Own ..... ₱ doz $27.00
Model ..... ₱ doz $27 00

Goshen Sweeper Company, Grand Rapids, Mich., make the following rebates:
5 dozen in 6 months ..... ₱ doz $1.00
10 dozen in 6 months ..... ₱ doz $2.00
25 dozen in 6 months ..... ₱ doz $3.00
Except on L. F, when 10 dozen price is $13.50, and 25 dozen $13.00.

Lawn—

Thompson Mfg. Co 30%

Tacks, Brads &c.—

List October 19, 1889. Old established straight Weights. Short Weight goods are sold at lower prices.

Carpet Tacks—
American, Blued 66⅔%
American, Tin'd and Cop'd 70%
Steel, Bright and Blued 66⅔%
Steel, Tinned and Coppered 70%
Swedes Iron, Blued 72½%
Swedes Iron, Tinned 70%
American Iron Tacks, Domestic 66⅔%
Swedes Iron Tacks—
S. S., Blued 66⅔%
S. S., Tinned 70%
Lanc., Blued 55%
Lanc., Tinned 60%
Gimp and Lace Tacks—
S. S., Blued 62½%
S. S., Tinned 66⅔%
Lanc., Blued 55%
Lanc., Tinned 60%
Basket and Trimmers' Tacks—
Lanc 52½%
S. S 60%
Hungarian Nails 60%
Common and Patent Brads 55%
Leathered Tacks 10%
Brush Tacks, S. S 60%
Looking Glass Tacks, S. S 35%
Picture-Frame Points, S. S 35%
Finishing Nails 60%
Trunk and Clout Nails—
Black 62½%
Tinned or Coppered 66⅔%
Basket Nails 60%
Chair Nails 52½%
Cigar Box Nails 45%
Tin Capped Nails 50%

Extra discount 25&2%

Miscellaneous—

Double Point ..... 90@90&10%
Wire Carpet Nails ..... 50&10%
Plymouth Rock Steel Carget Tacks .. 25%
Upholsterers' Nails 40%

Wire Brads and Nails—

Steel-Wire Brads, R. & E. Mfg. Co.'s list 50&10%

See also *Nails, Wire.*

Tapes, Measuring—

American ..... 40@40&5%
Spring 40%
Chesterman's, Regular list ..... 25@30%

Thermometers—

Tin Case ..... 80@80&10%

Thimble Skeins—See *Skeins.*

Ties, Bale—Steel.

Standard Wire, list ..... 50&10&5%

Tinners' Shears, &c —

See *Shears, Tinners' &c.*

Tinware—

Stamped, Japanned and Pieced, list Jan 20, 1887 ..... 70&10@70&25%

Tire Benders, Upsetters, &c.—See *Benders and Upsetters, Tire.*

Tools—

Coopers'—

Bradley's 20%
Barton's ..... 20@20&5%
L. & J. White ..... 20&5%
Albertson Mfg. Co 25%
Beatty's 30%
Sandusky Tool Co ..... 30@30&5%
Shaves Cincinnati Tool Co 20%

Lumber—

Ring Peavies, "Blue Line" .. ₱ doz $20.00
Ring Peavies, Common ..... ₱ doz $18.00
Steel Socket Peavies ..... ₱ doz $21.00
Mall. Iron Socket Peavies ... ₱ doz $19.00
Cant Hooks, "Blue Line" ..... ₱ doz $16.00
Cant Hooks, Common Finish .. ₱ doz $14.00
Cant Hooks, Mall. Socket Clasp, "Blue Line" Finish $16.00
Cant Hooks, Mall. Socket Clasp, Common Finish ..... ₱ doz $14.50
Cant Hooks, Clip Clasp, "Blue Line" Finish ..... ₱ doz $14.00
Cant Hooks, Clip Clasp, Common Finish ..... ₱ doz $12.00
Hand Spikes ..... ₱ doz 6 ft., $15.00; 8 ft., $20.00
Pike Poles, Pike & Hook, ₱ doz, 12 ft., $11.50; 14 ft., $12.50; 16 ft., $14.50; 18 ft., $17.50; 20 ft., $21.50.
Pike Poles, Pike only, ₱ doz, 12 ft., $10.00; 14 ft., $11.00; 16 ft., $13.00; 18 ft., $16.00; 20 ft., $20.00.
Pike Poles, not ironed, ₱ doz, 12 ft., $6.00; 14 ft., $7.00; 16 ft., $9.00; 18 ft., $12.00; 20 ft., $16.00.
Setting Poles, ₱ doz, 12 ft., $14.00; 14 ft., $15.00; 16 ft., $17.00.
Swamp Hooks ..... ₱ doz $18.00

Saw—

Atkins' Perfection .. ₱ doz $12.00
Atkins' Excelsior ..... ₱ doz $8.00
Atkins' Giant ..... ₱ doz $4.00

Tobacco Cutters—

See *Cutters, Tobacco.*

Transom Lifters—

See *Lifters, Transom.*

Traps—

Game—

Newhouse ..... 40@40&5%
Oneida Pattern ..... 70&10%
Game, Blake's Patent ..... 40&10&5%

Mouse and Rat—

Mouse Wood, Choker, ₱ doz holes, 9@10¢
Mouse, Round Wire ..... ₱ doz $1.50 10%
Mouse, Cage, Wire ..... ₱ doz $2.50 10%
Mouse, Catch-'em-alive .. ₱ doz $2.50 15%
Mouse, Bonanza ..... ₱ doz 0.90@$1.00
Rat, Decoy ..... ₱ gr $10.00, 10%
Ideal ..... ₱ gr $10.00
Cyclone ..... ₱ gr $5.25
Hotchkiss Metallic Mouse, 5-hole traps, ₱ doz., 75¢; in full cases, ₱ doz. 60@65¢
Hotchkiss Imp. Rat Killer .. ₱ gro $18.50
Hotchkiss New Rat Killer .. ₱ gro $16.50
Schuyler's Rat Killer ..... ₱ gro $15.00

Triers—

Butter and Cheese 25%

Trimmers, Spoke—

Bonney's ..... ₱ doz $10.00, 50%
Stearns' ..... 20&10%
Ives', No. 1, $15.00; No. 2, $12.00 ₱ doz. ..... 55&10%
Douglas' ..... ₱ doz $9.00, 20%
Cincinnati 25%

Trowels—

Lothrop's Brick and Plastering, 20&10&5@35%
Reed's Brick and Plastering 15%
Disston's Br'k and Plastering .. 25@25&5%
Peace's Plastering ..... 25@25&5%
Clement & Maynard's ..... 20@20&5%
Rose's Brick ..... 15@20%
Brade's Brick 25%
Worrall's Brick and Plastering 20%
Garden 70%
Cleves' Angle Trowel, ₱ gro, No. 1, $36; No. 2, $30; No. 3, $15. net @ 10%

Trucks, Warehouse, &c.—

B. & L. Block Co.'s list 40%
Thompson Mfg. Co 25%

Tubes, Boiler—

See Pipe.

Twine—

Flax Twine—

	BC.	B.
No. 9, ¼ and ⅛ ℔ Balls	25¢	31¢
No. 12, ¼ and ⅛ ℔ Balls	22¢	30¢
No. 18, ¼ and ⅛ ℔ Balls	20¢	29¢
No. 24, ¼ and ⅛ ℔ Balls	20¢	29¢
No. 36, ¼ and ⅛ ℔ Balls	18¢	28¢
No. 264 Mattrass, ¼ and ⅛ ℔ Balls	52@54¢	
Chalk Line, Cotton, ⅛ ℔ Balls	25¢	
Mason Line, Linen, ⅛ ℔ Balls	55¢	
2-Ply Hemp, ¼ and ⅛ ℔ Balls (Spring Twine)	15½¢	
3-Ply Hemp, 1 ℔ Balls	16@16½¢	
3-Ply Hemp, 1¼ ℔ Balls	15@15½¢	
Cotton Wrapping, 5 Balls to ℔	15@16¢	
2, 3, 4 and 5 Ply Jute, ¼ ℔ Balls	10¢	
Wool	6½@6¾¢	
Paper	13@14¢	
Cotton Mops, 6, 9, 12 and 15 ₱ to doz.	18¢	

Vises—

Solid Box ..... 50&10@50&10&5%

Parallel—

Fisher & Norris Double Screw ..... 15&10%
Stephens' ..... 25@30%
Parker's ..... 20@25%
Wilson's 55%
Howard's 40%
Bonney's 50%
Millers' Falls ..... 40@40&10%
Trenton ..... 40&5@40&10%
Merrill's ..... 15@20%
Sargent's ..... 70&10%
Backus and Union 40%
Double Screw Leg ..... 15&10%
Prentiss ..... 20@25%
Simpson's Adjustable 40%
Moore's 20%
Massey Quick Action ..... 20@25%

Saw Filers—

Bonney's, Nos. 2 & 3, $15.00 ..... 40&10%
Stearn's ..... 33⅓&10@33⅓&10&10%
Stearn's Silent Saw Vises ..... 33⅓@35%
Hopkins' ..... ₱ doz $17.50, 10%
Reading ..... 40&10%
Wentworth ..... 20&10%

Miscellaneous—

Combination Hand Vises ..... ₱ gr. $42.00
Cowell Hand Vises 20%
Bauer's Pipe Vises 10%
Cincinnati ..... 25&10%
Enterprise Pipe Vises, each $3.00
Massey Combination Pipe 40%

Wads—Price Per M.

U.M.C.&W.R.A.—B. E., 11 up	68¢
U.M.C.&W.R.A.—B. E., 9&10	82¢
U.M.C.&W.R.A.—B. E., 8	96¢
U.M.C.&W.R.A.—B. E., 7	$1.10
U.M.C.&W.R.A.—P. E., 11 up	1.15
U.M.C.&W.R.A.—P. E., 9&10	1.50
U.M.C.&W.R.A.—P. E., 8	1.70
U.M.C.&W.R.A—P. E., 7	1.80
Eley's B. E., 11 and larger	$1.70@$1.75
Eley's P. E., 12 to 20	3.00@ 3.25

Dis. 50&25%

Wagon Boxes—

See *Boxes, Wagon.*

Wagon Jacks—

See *Jacks, Wagon.*

Ware, Hollow—

Cast Iron, Hollow—

Stove Hollow-Ware—
Ground ..... 60&10%
Unground ..... 60&10&10%
White Enameled Ware—
Maslin Kettles ..... 75@75&5%
Boilers and Saucepans ..... 60@60&5%
Tinned Boilers and S'pans ..... 60@60&5%
Rustless Hollow Ware ..... 50@50&5%
Gray Enameled Ware—
Stove 50%
Maslin Kettles ..... 60@60&10%
Boilers and Saucepans ..... 40&5%

Enameled—

Agate and Granite Ware, list Jan. 1, 1889 ..... 33⅓&10%
Ironclad Enameled Ware ... dis 33⅓&10%

Kettles—

Galvanized Tea-Kettles—

Inch	6	7	8	9
Each	55¢	60¢	65¢	75¢

Standard Fiber—

	Per Doz. Plain.	Decorated.
Wash-Basins, 10½ in	$2.00	2.25
Wash-Basins, 12 in	2.25	2.50
Keelers, 11¾ in		4.00
Cuspidors		8.00
Spittoons, "Daisy," 8 in.	4.00	4.50
Peck Measure	4.00	
Half-peck Measure	3.50	

See also Pails.

Indurated Fiber.—

Spittoons No. 2, ₱ doz $3.40
Basins, Ringed, ₱ doz., No. 2 ..... 3.00
Washtubs, Nested, Nos. 0, 1, 2 and 3 (4 pieces), ₱ nest $7.50
Keelers Nested, Nos. 1, 2, 3 and 4 (4 pieces), ₱ nest $2.90
Butter Bowls 15, 17 and 19-inch (3 pieces), ₱ nest $1.70
Liquid Measures, pt., qt., 2 qt. and funnell (4 pieces), ₱ set $1.60

Dis. 25%

See also Pails.

Silver Plated, Hollow—

4 mo. or 5 % cash in 30 days.

Reed & Barton .....
Meriden Britannia Co. ..... } 40&5%
Simpson, Hall, Miller & Co. .....
Rogers & Brother .....
Hartford Silver Plate Co. ..... } 40&5&5%
William Rogers Mfg. Co. .....

Washers—

Size hole..... 5-16 ⅜ ½ ⅝ to 1⅜
Washers..... ..... 5½ 4½ 3½ 2⅝
In lots less than 200 ℔, ₱ ℔, add ¼¢, 5-℔ boxes 1¢ to list.

Washer Cutters—

See *Cutters, Washers.*

Wedges—

Iron.....₱ ℔ 3½¢
Steel.....₱ ℔ 3¾¢

Weights, Sash—

Solid Eyes.....₱ ton $18.00@$19.00

Well Buckets Galvanized—

See *Buckets, Well, Galvanized.*

Wheels, Well—

8 in., $2.25; 10 in., $2.70; 12 in., $3.25

Wire and Wire Goods—

Iron—

Market,
Br.& Ann.,Nos.0 to 18.75&10@75&10&5%
Cop'd, Nos. 0 to 18..... .....75&5%
Galv., Nos. 0 to 18..... 70@70&5%
Tin d, Tin'd list, Nos. 0 to 18.70@70&10%

Stone,
Br. and Ann'd, Nos. 16 to 18..... .....80%
Bright and Ann'd, Nos. 19 to 26...80&5%
Br. and Ann'd, Nos. 27 to 36.....82½&5%
Tinned.....

Tinned Broom Wire, 18 to 21, ₱ ℔...4¾¢
Galvanized Fence, Nos. 8 and 9... 70&10%
Brass, list Jan. 18, 1884..... 25@33⅓%
Copper, list Jan. 18, 1884..... 33⅓@40%
Annealed Wire on Spools..... 60%
Malin's Steel and Tin'd on Spools.....60%
Malin's Brass and Cop. on Spools 50%
Tate's Spooled, Tin'd & Annealed..60&5%
Tate's Spooled Cop. and Brass 50%
Cast Steel Wire 50%
Stubs' Steel Wire .....$6.00 to £, 30%
Steel Music Wire, 12 to 30, imported.... 60@70¢ ₱ ℔
Wire Clothes Line, see Lines.
Wire Picture Cord, see Cord.

Bright Wire Goods—

Standard list.....80&20@85%

Wire Cloth and Netting—

Painted Screen Cloth, good quality, ₱ 100 sq. ft., $1.40
Galvanized Wire Netting.....75@75&10%

Wire, Barb—

See Trade Report.

Wire Rope—

See *Rope, Wire.*

Wrenches—

American Adjustable 40%
Baxter's Adjustable "S".....40&10@50%
Baxter's Diagonal.....60%
Coes' Genuine.....50&3%
Coes' "Mechanics".....50&10&3%
Girard Standard.....65&10@70%
Lamson & Sessions' Engineers'....60&10%
Lamson & Sessions' Standard.....70&10%
P. S. & W. Agricultural.....
Girard Agricultural..... } 75&10@80%
Lamson & Sessions' Agric'l..
Bemis & Call's:
Pat. Combination.....40%
Merrick's Pattern.....35%
Brigg s Pattern.....25%
Cylinder or Gas Pipe.....40&5%
No. 3 Pipe.....50%
Aiken's Pocket (Bright).....$6.00, 50&10%
The Favorite Pocket.....₱ doz., $.400, 40%
Webster's Pat. Combination..... .....25%
Boardman's.....30%
Always Ready.....25&5%
Alligator.....50%
Donohue's Engineer.....20&10%
Acme, Bright.....50&2%
Acme, Nickeled.....40&2%
Hercules.....70@70&5%
Walker's.....55&2%
Diamond Steel.....55&2%
Cincinnati Brace Wrenches.....25&10%
Tafts' Vise Wrench.....55&10&3%

Wringers, Clothes—

Am. Wringer Co.'s list,July1,'92..2% cash
Colby WringerCo.,listSept.1, '91..2% cash
Lovell Mfg. Co., list Jan. 1, 1892..2% cash
Peerless Mfg. Co., list Feb., 1892..2% cash
National Wringer & Mfg Co., list June 1, 1892..... .....2% cash

Wrought Goods—

Staples, Hooks, &c., list March 17, 1892 85&10@85& 20%

Paints, Oils and Colors.—Wholesale Prices.

Animal and Vegetable Oils—

Linseed, City, raw.. per gal.	..	@	46
Linseed, City, boiled.....	..	@	49
Linseed, Western, raw.....	..	@	46
Lard, City, Extra Winter...	86	@	87
Lard, City, Prime.....	85	@	87
Lard, City, Extra No. 1.....	60	@	65
Lard, City, No. 1.....	45	@	50
Lard, Western, prime.....	85	@	86
Cotton-seed, Crude, prime..	33½	@	34
Cotton-seed, Crude, off grades.....	30	@	32
Cotton-seed, Summer Yellow, prime.....	37½	@	38
Cotton-seed, Summer Yellow, off grades.....	34	@	36
Sperm, Crude.....	68	@	70
Sperm, Natural Spring.....	67	@	70
Sperm, Bleached Spring....	72	@	75
Sperm, Natural Winter.....	73	@	76
Sperm, Bleached Winter....	78	@	81
Whale, Crude.....	43	@	45
Whale, Natural Winter.....	52	@	53
Whale, Bleached Winter....	55	@	57
Whale, Extra Bleached.....	57	@	58
Sea Elephant, Bleached Winter.....	..	@	..
Menhaden, Crude, Sound...	33	@	35
Menhaden, Crude, Southern	..	@	..
Menhaden, Light Pressed...	37	@	38
Menhaden, Bleached W'ter.	41	@	..
Menhaden, Extra Bleached.	42	@	43
Tallow, City, prime.....	50	@	55
Tallow, Western, prime....	45	@	50
Cocoanut, Ceylon.....	5¼	@	5½
Cocoanut, Cochin.....	6	@	6¼
Cod, Domestic.....	38	@	40
Cod, Foreign.....	42	@	45
Red Elaine.....	35	@	36
Red Saponified.....₱ ℔	4½	@	5
Bank..... per gal	35	@	36
Straits.....	36	@	37
Olive, Italian, bbls.....	64	@	65
Neatsfoot, prime.....	50	@	55
Palm, prime, Lagos.....₱ ℔	5¾	@	6¼

Mineral Oils—

Black, 29 gravity, 25 @ 30 cold test.....per gal	7	@	7½
Black, 29 gravity, 15 cold test.....	7½	@	8
Black, 29 gravity, summer..	6	@	6¼
Cylinder, light, filtered.....	14	@	16
Cylinder, dark, filtered.....	10	@	13
Paraffine, 23½ @ 24 gravity..	11½	@	12
Paraffine, 25 gravity.....	10½	@	11
Paraffine, 28 gravity..... ..	8	@	8½
Paraffine, red.....	9	@	13

Paints and Colors—

Barytes, Foreign, ℔ ton..$22.00	@24.00		
Barytes, Amer. floated....29.00	@32.00		
Barytes, Amer. No. 1.....16.00	@18.00		
Barytes, Amer. No. 2.....13.00	@15.00		
Barytes, Amer. No. 3.....11.00	@12.00		
Blue, Celestial.....₱ ℔	6	@	8
Blue, Chinese.....	40	@	50
Blue, Prussian.....	25	@	40
Blue, Ultramarine.....	8	@	25
Brown, Spanish.....	½	@	1
Brown, Vandyke, Amer...	3	@	3½
Brown, Vandyke, English.	6	@	8
Carmine, No. 40, in bulk..	3.10	@	..
Carmine, No. 40, in boxes or barrels.....	3.20	@	..
Carmine, No. 40, in ounce bottles.....	4.20	@	..
Chalk, in bulk.....₱ ton.		@	1.75
Chalk, in bbls..₱ 100 ℔...	33	@	40
China Clay, English.....			
₱ ton.13.00		@	18.00
Cobalt Oxide, prep'd.....	9.00	@	11.00
Cobalt Oxide, black.....			
lots 100 ℔.	1.90	@	....
Cobalt Oxide, black.....			
less 100 ℔.	1.96	@	....
Green, Paris, in bulk.....	13	@	15½
Green, Paris, 170 @ 175 ℔ kegs.....	14	@	16
Green, Paris, small pack.	15½	@	22
Green, Chrome, ordinary.	6	@	12
Green, Chrom., pure.....	22	@	25
Lead, Eng., B.B. white....	8½	@	10
Lead, Amn. White, dry or in oil:			
Kegs, lots less than 500 ℔...	7¼	@	7½
Kegs, lots 500 ℔ to 5 tons...	6¾	@	7
Kegs, lots 5 tons to 12 tons..	6⅝	@	6⅞
Kegs, lots 12 tons and over..	6½	@	6¾
Lead, White, in oil, 25 ℔ tin pails, add to keg price.....	..	@	½
Lead, White, in oil, 12½ ℔ tin pails, add to keg price.....	..	@	1
Lead, White, in oil, 1 to 5 ℔ assorted tins, add to keg price.	..	@	½
Lead, Red, bbls. and ½ bbls...	6¾	@	7¼
Lead, Red, kegs.....	6¼	@	7¼
Litharge, kegs.....	6¼	@	7¼
Litharge, bbls. and ½ bbls.....	6¼	@	7¼

TERMS, &c.—Lead and Litharge.—On lots of 500 ℔ or over, 60 days' time or 2½ % discount for cash if paid within 15 days of date of invoice.

Ocher, Rochelle.....	1.35	@	1½
Ocher, French Washed.....	1½	@	2½
Ocher, German Washed....	1½	@	3
Ocher, American.....	½	@	1½
Orange Mineral, English....	8½	@	9
Orange Mineral, French....	10	@	10½
Orange Mineral, German....	8½	@	9
Orange Mineral, American.	8¾	@	8¾
Paris White, English Cliff stone.....	1.00	@	1.15
Paris White, American.....	65	@	75
Red, Indian, English.....	5½	@	7
Red, Indian, American.....	2	@	6½
Red, Turkey.....	9	@	14
Red, Tuscan.....	9	@	11
Red, Venetian, American... ₱ 100 ℔..1.00		@	1.10
Red, Venetian, English.....	1.20	@	1.35
Sienna, Italian, Burnt and Pow'd, ₱ ℔	4	@	5
Sienna, Ital., Burnt Lumps.	1½	@	3½
Sienna, Ital., Raw, Powd...	4½	@	5½
Sienna, Ital., Raw, Lumps..	1¾	@	3½
Sienna, American, Raw.....	1½	@	1¾
Sienna, American, Burnt and Powdered.....₱ ℔	1¼	@	1¾
Talc, French.....	..	@	1¼
Talc, American.....	1¼	@	1⅝
Terra Alba, Fr'ch. ₱ 100 ℔	95	@	1 25
Terra Alba, English.....	70	@	80
Terra Alba, American No. 1	65	@	75
Terra Alba, American No. 2	45	@	50
Umber, Turkey, Burnt and Powdered.....₱ ℔	3½	@	4
Umber, Turkey Bnt. Lu.....	2¾	@	3
Umber, Turkey, Raw and Powdered.....	3¼	@	....
Umber, Turkey, R'w Lumps	2¼	@	2¾
Umber, Turkey, Bnt. Amer..	1¼	@	1½
Umber, Turkey, R'w Amer.	1¼	@	1½
Yellow, Chrome.....	10	@	25
Vermilion, American Lead.	11½	@	12
Vermilion, Quicks'er, bulk..	57	@	..
Vermilion, Quicks'er, bags..	58	@	..
Vermilion, Quicksilver sm'r pkgs.....	62	@	..
Vermilion, English Import.	85	@	90
Vermilion, Imitation, Eng'.	8	@	35
Vermilion, Trieste.....	90	@	92½
Vermilion, Chinese.....	92½	@	95
Whiting Common, ₱ 100 ℔	37½	@	42½
Whiting Gilders'....	45	@	55
Zinc, American, dry.....₱ ℔	4¼	@	5
Zinc, French, Red Seal.....	7	@	.
Zinc, Fre ch, Green Seal.....	9	@	..
Zinc, Fre ch, V. M. X.....	..	@	7
Zinc, Antwerp, Red Seal....	7	@	..
Zinc, Antwerp, Green Seal..	7	@	..
Zinc, German, L. Z. O.....	6¾	@	7¼
Zinc, V. M. in Poppy Oil, G. Seal, lots of 1 ton and over.....	10¾	@	11¼
lots less than one ton.....	11	@	11½
Zinc, V. M. in Poppy Oil, Red Seal..	..	@	..
lots of 1 ton and over.....	10	@	10½
lots of less than 1 ton.....	10½	@	10¾

DISCOUNTS.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1%; 25 bbls., 2%; 50 bbls. 4%. No discount allowed on less than bbl. lots.

Colors in Oil—

Black, Drop, Frankfort.....	25	@	30
Black, Drop, English.....	12	@	15
Black, Drop, Domestic.....	7	@	10
Black, Lampblack, Best	20	@	35
Black, Lampblack, Common	7	@	18
Black, Ivory.....	8	@	15
Blue, Chinese.....	35	@	40
Blue, Prussian.....	20	@	45
Blue, Ultramarine.....	12	@	18
Brown, Vandyke.....	7	@	12
Green, Chrome.....	8	@	13
Green, Paris.....	10	@	18½
Sienna, Raw.....	7	@	14
Sienna, Burnt.....	7	@	14
Umber, Raw.....	7	@	10
Umber, Burnt.....	7	@	10

Putty—

In barrels and ½ bbls.....	.01¾	@	.01¾
In tubs.....	.01¾	@	.01¾
In tin cans.....	.01¾	@	.02¼
In bladders..	.01¾	@	.02¼

Spirits Turpentine—

In regu bbls	..	@	31½
In machine bbls.....	..	@	32

Glue—

Low Grade.....₱ ℔	8	@	10
Cabinet.....	12	@	14
Medium White.....	13	@	15
Extra White.....	17	@	20
French.....	10	@	22
English.....	10	@	15
Irish.....	12	@	..

WHY NOT?

Why not try a sample lot of "Queen City" Fruit and Jelly Presses? Get the Best.

SHEPARD HARDWARE CO.,

BUFFALO, N. Y.

Representatives on Pacific Coast, CHAS. L. PIERCE & CO., 202 Market St., SAN FRANCISCO, CAL.

Representative in Canada, H. D. SIMMONS, 74 York St., TORONTO, CAN.

CURRENT METAL PRICES.

DECEMBER 7, 1892.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from Store—

Common Iron:	
¾ to 2 in. round and square.. 1 to 6 in. x ⅜ to 1 in....	₩ lb 1.90 @ 2.00¢
Refined Iron:	
¾ to 2 in. round and square. 1 to 4 in. x ⅜ to 1¼ in.... 4¼ to 6 in. x ⅜ to 1 in.	₩ lb 2.00 @ 2.10¢
1 to 6 in. x ¼ and 5-16	₩ lb 2.20 @ 2.30¢
Rods—⅜ and 11-16 round and sq.	₩ lb 2.10 @ 2.20¢
Bands—1 to 6 x 3-16 to No. 12	₩ lb 2.30 @ 2.40¢
"Burden Best" Iron, base price.	₩ lb 3.00¢
Burden's "H. B. & S." Iron, base price	₩ lb 2.80¢
"Ulster"	₩ lb 3.00¢
Norway Bars	3.75 @ 4.00¢
Norway Shapes	4.50 @ 5.00¢

Merchant Steel from Store—

	Per lb
Open-Hearth and Bessemer Machinery, Toe Calk, Tire and Sleigh Shoe, base price in small lots	2¾¢
Best Cast Steel, base price in small lots	8 ¢
Best Cast Steel Machinery, base price in small lots	5 ¢

Sheet Iron from Store—

	Black—Common American.	Black—R. G. Cleaned American.
Nos. 10 to 16	₩ lb 3 @	3¼¢
17 to 20	₩ lb 3¼ @	3⅜¢
21 to 24	₩ lb 3½ @	3⅝¢
25 and 26	₩ lb 3¾ @	3¾¢
27	₩ lb 3¼ @	3¼¢
28	₩ lb 3⅝ @	4 ¢
American B. B.	₩ lb 4¢ @ 4¼¢	

Galvanized Sheet Iron—

	B. B.
Nos. 10 to 16	₩ lb 4.20¢
17 to 22	₩ lb 4½¢
23 to 24	₩ lb 4¾¢
25 to 26	₩ lb 5 ¢
27	₩ lb 5¼¢
28	₩ lb 5½¢
29 to 30	₩ lb 6¼¢
Genuine Russia, according to assortment	₩ lb 12¢ @ 13¢
Patent Pianished	₩ lb A, 10¢; B, 9¢
Craig Polished Sheet Steel	₩ lb, 8½¢

English Steel from Store—

Best Cast	₩ lb 15 ¢
Extra Cast	₩ lb 16½ @ 17 ¢
Swaged, Cast	₩ lb 16 ¢
Best Double Shear	₩ lb 15 ¢
Blister, 1st quality	₩ lb 12 ¢
German Steel, Best	₩ lb 10 ¢
2d quality	₩ lb 9 ¢
3d quality	₩ lb 8 ¢
Sheet Cast Steel, 1st quality	₩ lb 15 ¢
2d quality	₩ lb 14 ¢
3d quality	₩ lb 12½¢
R. Mushet's "Special"	₩ lb 48 ¢
" " " Annealed	₩ lb 75 ¢
" " "Titanic"	₩ lb 20 ¢

METALS—

Tin—

	Per lb
Banca, Pigs	22 ¢
Straits, Pigs	21½¢
Straits in Bars	23 ¢

Tin Plates—

Duty: 2.2¢ ₩ lb.

Charcoal Plates—Bright—

Guaranteed Plates command special prices, according to quality. Per box.

Melyn and Calland Grade.	IC, 10 x14..	@	$6.50
" " "	IC, 12 x12..	@	6.75
" " "	IC, 14 x20..	@	6.50
" " "	IC, 20 x28..	@	13.00
" " "	IX, 10 x14..	@	8.50
" " "	IX, 12 x12..	@	8.75
" " "	IX, 14 x20..	@	8.50
" " "	IX, 20 x28..	@	17.00
" " "	DC, 12½x17..	@	6.00
" " "	DX 12½x17..	@	8.00
Allaway Grade	IC, 10 x14..	@	6.00
" "	IC, 12 x12..	@	6.25
" "	IC, 14 x20..	@	6.00
" "	IC, 20 x28..	@	12.00
" "	IX, 10 x14..	@	7.50
" "	IX, 12 x12..	@	7.75
" "	IX, 14 x20..	@	7.50
" "	IX, 20 x28..	@	15.00
" "	DC, 12½x17.	@	5.50
" "	DX, 12½x17..	@	7.00

Coke Plates—Bright—

Steel Coke.—IC, 10 x 14, 14 x 20..	$5.50	@	$5.60
10 x 20..	..	@	8.50
20 x 28..	11.50	@	12.00
IX, 10 x 14, 14 x 20..	....	@	7.00
BV Grade.—IC, 10 x 14, 14 x 20..	....	@	5.60

Charcoal Plates—Terne—

Guaranteed Plates command special prices according to quality.

Dean Grade.—IC, 14 x 20	..	@	$5.75
20 x 28	11.00	@	11.25
IX, 14 x 20	....	@	6.50
20 x 28	....	@	13.00
Abecarne Grade.—IC, 14 x 20	..	@	5.65
20 x 28	....	@	11.00
IX 14 x 20	....	@	6 50
20 x 28	....	@	13.00

Tin Boiler Plates—

XA, 4x 26	112 sheets	@ $13.35
IXX, 14 x 28	112 sheets	@ 14.50
IXX, 14 x 31	112 sheets	@ 16.00

American Terne Plates.—Apollo.

IC, 14 x 20	$6.25
IC, 20 x 28	12.50
IX, 14 x 20	7.25
IX, 20 x 28	14.50

Copper—

Duty: Pig, Bar and Ingot, 1¼¢; Old Copper, 1¢ ₩ lb. Manufactured (including all articles of which Copper is a component of chief value), 35 % ad valorem.

Ingot—

Lake	@ 13 ¢
Ansonia grade Arizona	@ 12¼¢
Ansonia grade Casting	@ 11½¢

Sheet and Bolt—

Prices adopted by the Association of Copper Manufacturers of the United States, May 19, 1892. Subject to a discount of 10 % @ 20 %, according to size of order.

Not wider than	Not longer than	And longer than	Weights per sq. foot and prices per pound. Over 64 oz.	32 to 64 oz.	16 to 32 oz.	14 to 16 oz.	12 to 14 oz.	10 to 12 oz.	8 to 10 oz.	Less than 8 oz.
30	72		32	32	32	23	24	25	28	30
30		72	32	32	32	23	25	27	31	....
36	96		32	32	32	24	26	30	33	....
36		96	32	32	32	25	27	31	35	...
48	96		32	32	32	24	28	32	....	....
48		96	32	32	25	27	29	33	..	....
60	96		32	32	27	29	34	....	....	....
60		96	32	23	28	..	....	....	....	....
84	96		23	24	....	....	....	....	....	....
84		96	24	25	....	....	....	....	....	....
Ov'r 84 in. wide			25	27	....	....	....	....	....	....

Bolt Copper, ⅜ inch diameter and over, per pound 22¢

Circles, Segments and Pattern Sheets, 60 in. diameter and less, 3¢ ₩ lb advance over prices of Sheet Copper required to cut them from.

Circles, Segments and Pattern Sheets, over 60 in. diameter, up to 96 in. diameter inclusive, 4¢ ₩ lb advance over prices of Sheet Copper required to cut them from.

Circles, Segments and Pattern Sheets, over 96 in. diameter, 5¢ ₩ lb advance over prices of Sheet Copper required to cut them from.

Cold or Hard Rolled Copper 14 oz. ₩ square foot and heavier, 1¢ ₩ lb over the foregoing prices.

Cold or Hard Rolled Copper lighter than 14 oz. ₩ square foot, 2¢ ₩ lb over the foregoing prices.

All Polished Copper over 20 in. wide, 2¢ ₩ lb advance over the foregoing prices.

Copper Bottoms, Pits and Flats—

	Per lb.
14 ounce to square foot and heavier	26¢
12 ounce and up to 14 ounce to square foot	27¢
10 ounce and up to 12 ounce	29¢
Lighter than 10 ounce	32¢

Circles less than 8 inches diameter, 2¢ ₩ lb additional.

Circles over 13 inches diameter are not classed as Copper Bottoms.

10 % @ 20 % discount, according to size of order.

Copper Wash Bowl Bottoms—

Tinned ₩ lb 34¢, 10% @ 20%

Tinning—

Net.

Tinning sheets on one side, 10, 12 and 14 x 48 each	8¢
Tinning sheets on one side, 30 x 60 each	30¢
For tinning boiler sizes, 9 in. (sheets 14 in. x 60 in.), each	15¢
For tinning boiler sizes, 8 in. (sheets 14 in. x 56 in.), each	12¢
For tinning boiler sizes, 7 in. (sheets 14 in. x 52 in.), each	12¢
Tinning sheets on one side, other sizes, per square foot	2½¢
For tinning both sides double the above prices.	

Planished Brass and Copper—

Not larger than 30 x 60.

16 oz. and heavier	24¢ ₩ lb
14 oz.	25¢ ₩ lb
12 oz.	27¢ ₩ lb

Seamless Brass Tubes—

July 6, 1892. Net.

O. G.	N. G.	⅜	⅓	⅝	¾	⅞	1	1⅛
8-14	6-12	32	28	25	24	23	22	19
15	13	33	28	26	25	24	23	20
16	14	34	29	27	26	25	24	20
17	15	35	30	28	27	26	25	21
18	16	37	31	29	27	26	25	22
19	17	38	32	30	29	28	27	24
20	18-19	39	34	32	31	30	29	26
21	20	41	36	34	33	32	31	29
22	21	43	37	35	34	33	32	31
23	22	45	39	37	36	35	34	34
24	23	48	41	39	38	36	35	36
25	24	51	44	41	40	39	38	40

Copper, Bronze and Gilding Tube, 3¢ ₩ lb additional

Brazed Brass Tubing. (To No. 20 inclusive.)

Above 5-16 inch to 3 inch, inclusive	35¢
Plain, above 3 inch	45¢
Plain, 5-16 inch	45¢
Plain, ¼ inch	60¢
Plain, 3-16 inch	$1.00
Plain, ⅛ inch	$1.50
Fancy Tubing, Brass, to No. 20, inclusive	43¢ ₩ lb
Bronze Tubing, 3¢ ₩ lb more than Brass.	
Discount from list	30 @ ..%

Roll and Sheet Brass—

(Brown & Sharpe Standard Gauge.)

Common High Brass: Wider than and including	in. 8	in. 10	in. 12	in. 14	in. 16	in. 18	in. 20	in. 22	in. 24
To No. 20, inclusive	.21	.22	.23	.25	.27	.29	.31	.33	
Nos. 21, 22, 23 and 24	.22	.23	.24	.26	.28	.30	.32	.34	
Nos. 25 and 26	.22½	.23½	.24½	.27	.29	.31	.33	.35	
Nos. 27 and 28	.23	.24	.25	.28	.30	.32	.34	.36	
Common High Brass: Wider than and including	in. 10	in. 12	in. 14	in. 16	in. 18	in. 20	in. 22	in. 24	
To No. 20, inclusive	.21	.22	.23	.25	.27	.29	.31	.33	
Nos. 21, 22, 23 and 24	.22	.23	.24	.26	.28	.30	.32	.34	
Nos. 25 and 26	.22½	.23½	.24½	.27	.29	.31	.33	.35	
Nos. 27 and 28	.23	.24	.25	.28	.30	.32	.34	.36	

Common High Brass: Wider than and including	in. 24	in. 26	in. 28	in. 30	in. 32	in. 34	in. 36	in. 38
	26	28	30	32	34	36	38	40
To No. 20, inclusive	.36	.39	.42	.46	.50	.55	.60	.65
Nos. 21, 22, 23 and 24	.37	.40	.43	.47	.51	.56	.61	.68
Nos. 25 and 26	.38	.41	.44	.48	.52	.57	.63	.71
Nos. 27 and 28	.39	.42	.45	.49	.53	.58	.65	.75

Discount from List 10 % to 25 %.

Brass and Copper Wire—

List January 17, 1884.

Numbered by Stubs' gauge.	Soft & hard high brass.	Spring high brass.	Low brass.	Copper.
All Nos. to No. 16, inclusive	$0.22	$0.24	$0.26	$0.30
No. 17 and No. 18	.23	.25	.27	.31
No. 19 and No. 20	.24	.26	.28	.32
No. 21, or 0.032 diameter	.25	.27	.29	.33

Discount 10 % to 25 %.

Fine Numbers.

Numbered by London gauge.	Brass.	Spring high brass.	Low brass.	Copper.
No. 22	$0.26	$0.28	$0.30	$0.34
No. 23	.28	.30	.32	.36
No. 24	.30	.32	.34	.38
No. 25	.32	.34	.36	.40
No. 26	.35	.37	.39	.43
No. 27	.38	.40	.42	.46
No. 28	.42	.44	.46	.51
No. 29	.45	.47	.49	.54
No. 30	.48	.50	.52	.62
No. 31	.51	.53	.55	.67
No. 32	.55	.57	.59	.73
No. 33	.59	.61	.63	.82
No. 34	.64	.66	.68	.95
No. 35	.70	.72	.74	1.30
No. 36	.76	.78	.80	1.50
No. 37	1.00	1.02	1.04	1.70
No. 38	1.30	1.32	1.34	2.00
No. 39	2.00	2.02	2.00	3.25
No. 40	2.60	2.62	2.60	5.75

— % discount.

Spring Wire, 2¢ ₩ lb advance.

Copper Belt and Hose Rivets and Burrs—

Per lb.		Per lb.
No. 5	49¢	No. 11 56¢
No. 6	49¢	No. 12 58¢
No. 7	49¢	No. 13 60¢
No. 8	50¢	No. 14 65¢
No. 9	52¢	No. 15 70¢
No. 10	54¢	

60 % @ 5 % discount.

Tobin Bronze—Rods.

Drawn Rods for Bolts, Forgings, &c.

¼ to 3½ inches inclusive	17¢ ₩ lb
Over 3½ to 5 inches inclusive	18¢ ₩ lb

Piston Rods, Finished True, Smooth and Straight.

¼ to 3½ inches inclusive	18¢ ₩ lb
Over 3½ to 5 inches inclusive	19¢ ₩ lb

Spelter—

Duty: Pig, Bars and Plates, $1.50 ₩ 100 lb.	
Western Spelter	5¼¢
Bertha (pure)	8¼¢

Zinc—

Duty: Sheet, 2½¢ ₩ lb.	
600 lb casks	7 ¢
Per lb	7½¢

Lead—

Duty: Pig, $2 ₩ 100 lb. Old Lead, 2¢ ₩ lb. Pipe and Sheets, 2½¢ ₩ lb.	
American Pig	4.25¢
Bar	5¢
Pipe, subject to discount 20%	6¼¢
Tin-Lined Pipe, subject to discount 20%	15¢
Block Tin Pipe, subject to discount 20%	37½¢
Sheet, subject to discount 20%	7¢
Old Lead in exchange, 3½¢ ₩ lb.	

Solder—

½ @ ½ (Guaranteed)	13½¢ @ 15¢
No. 1	11½¢ @ 12½¢

Prices of Solder indicated by private brands vary according to composition.

Antimony—

Cookson	₩ lb 12½¢
Hallett's	" 11 ¢

Aluminum—

Prices per Ton.

Duty: 15¢ ₩ lb.

Over 98% pure	₩ lb .75
94% @ 98% pure	₩ lb .65

Old Metals—

Prices Paid in New York.

Heavy Copper	₩ lb 10 ¢
Light and Tinned Copper	₩ lb 9 ¢
Heavy Brass	₩ lb 7 ¢
Light Brass	₩ lb 6 ¢
Lead	₩ lb 3½¢
Tea Lead	₩ lb 3½¢
Zinc	₩ lb 2½¢
No. 1 Pewter	₩ lb 14 ¢
No. 2 Pewter	₩ lb 7 ¢
Wrought Scrap Iron	₩ gross ton $17.00
Heavy Cast Scrap	₩ gross ton 10.00
Stove Plate Scrap	₩ gross ton 7.00
Burnt Iron	₩ gross ton 5 00